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No 263, "The implications of globalisation for the ECB monetary policy strategy".
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No 279, "The need for an inflation buffer in the ECB's price stability objective – the role of nominal rigidities and inflation differentials".
No 280, "Understanding low inflation in the euro area from 2013 to 2019: cyclical and structural drivers".

Contents

Abstract

The last review of the ECB's monetary policy strategy in 2003 followed a period of predominantly upside risks to price stability. Experience following the 2008 financial crisis has focused renewed attention on the question of how monetary and fiscal policy should best interact, in particular in an environment of structurally low interest rates and persistent downside risks to price stability. This debate has been further intensified by the economic impact of the coronavirus (COVID-19) pandemic. In the euro area, the unique architecture of a monetary union consisting of sovereign Member States, with cross-country heterogeneities and weaknesses in its overall construction, poses important challenges.

Against this background, this report revisits monetary-fiscal policy interactions in the euro area from a monetary policy perspective and with a focus on the ramifications for price stability and maintaining central bank independence and credibility. The report consists of three parts.

The first chapter presents a conceptual framework for thinking about monetary-fiscal policy interactions, thereby setting the stage for a discussion of specifically euro area aspects and challenges in subsequent parts of the report. In particular, it reviews the main ingredients of the pre-global financial crisis consensus on monetary-fiscal policy interactions and addresses significant new insights and refinements which have gained prominence since 2003. In doing so, the chapter distinguishes between general conceptual aspects – i.e. those aspects that pertain to an environment characterised by a single central bank and a single fiscal authority and those aspects that pertain to an environment characterised by a single central bank and many fiscal authorities (a multi-country monetary union).

The second chapter reviews the experiences and challenges of monetary-fiscal policy interactions in the Economic and Monetary Union (EMU) and how these have evolved since the last strategic review. It starts by recalling policy views on the allocation of roles between monetary and fiscal authorities as well as between national governments and European institutions at the start of EMU. It then illustrates the strengths and weaknesses of this set-up, based on the experiences of the past two decades. The chapter finishes with an overview of the euro area institutional framework and policy toolbox as it was before the COVID-19 pandemic struck.

The third chapter begins with a review of the monetary and fiscal developments triggered by the COVID-19 pandemic. It then takes a forward-looking perspective and addresses the options and challenges for monetary-fiscal policy interactions in a post-pandemic environment characterised by a low natural rate.

The assessment takes the current EMU institutional framework as a given. At the same time the report acknowledges that any changes to the architecture may have important implications for the interaction between monetary and fiscal policy in EMU. Some considerations regarding the agenda for EMU reform are offered in the final section of the report.

The report summarises the work done by a dedicated European System of Central Banks (ESCB) strategy review work stream on monetary-fiscal policy interactions – mandated by the Monetary Policy Committee – which served as input for the Strategy Review Seminar on monetary-fiscal policy interactions. Alongside the main text the report contains 19 standalone boxes on specific aspects of monetary-fiscal policy interactions, which have been drafted under the responsibility of individual members of the work stream and do not necessarily reflect the views of all work stream members.

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1 A conceptual framework for discussing and rethinking the conventional view

Chapter 1 of the report reviews the literature on interactions between monetary and fiscal policy. It does not refer to the euro area experience or draw policy conclusions. The objective is to sketch a conceptual framework for thinking about monetary-fiscal policy interactions. At the outset, the "consensus view" prevalent before the global financial crisis of 2008 is summarised (Section 1.1). Next, new insights and refinements of the pre-crisis consensus view, which have gained prominence since 2008, are described in two steps: aspects that can be conceptualised in an environment characterised by "a single central bank and a single fiscal authority" (Section 1.2), and aspects specific to a monetary union, characterised by "a single central bank and many fiscal authorities" (Section 1.3). By providing this conceptual framework, Chapter 1 sets the stage for discussions of the euro area experience and policy challenges in Chapter 2 and Chapter 3 of the report.

1.1 Pre-global financial crisis consensus on monetary and fiscal policy

Monetary policy and fiscal policy interact in many ways. A central bank's interest rate policy influences – via arbitrage in financial markets – interest rates on public debt of all maturities. Government spending, taxation and budget balance affect economic activity and the price level. Inflation has fiscal implications.[1] The central bank's balance sheet is part of the public sector's balance sheet. Both the central bank and the fiscal authority supply assets (by issuing currency, reserves and government bonds) that provide liquidity services to firms and households.[2]

By the end of the last century, a broad agreement emerged in favour of central bank independence with a medium-term price stability objective for the central bank. According to this view, an independent central bank would achieve price stability over the medium term by setting short-term interest rates. Fiscal policy would provide automatic business cycle stabilisers (such as unemployment benefits), fulfil other social efficiency and equity objectives, and keep public debt stable. There would be little role for discretionary, countercyclical fiscal policy. There remains a consensus that this model of monetary-fiscal policy interactions is a useful benchmark when recessionary disturbances are at most moderate, nominal interest

1 Anticipated inflation yields seigniorage revenue for the public sector. Unanticipated inflation shifts wealth between holders of public debt and the public sector (taxpayers).

2 See Bassetto and Sargent (2020) for a survey of the literature on monetary-fiscal policy interactions. On liquidity services from government bonds see Krishnamurthy and Vissing-Jorgensen (2012).

rates are sufficiently far away from their lower bound, and financial markets function smoothly.[3]

This view tended to emphasise the possibility of upside risks to price stability. Policymakers and legislators, while recognising the multifaceted nature of policy interactions, were primarily concerned with ruling out a scenario of "fiscal dominance" in which excessive budget deficits would put pressure on the central bank to engage in inflationary policy.[4]

The global financial crisis of 2008 and the subsequent period of low interest rates have prompted a rethinking of how monetary and fiscal policy interact. New insights have emerged, while some existing ideas have received more emphasis than they did in the past. The result is a more nuanced view, summarised below which, among other things, recognises the possibility of persistent downside risks to price stability in a more symmetric way, in addition to the upside risks.[5]

1.2 Refinements and novel aspects of monetary-fiscal policy interactions in an environment characterised by a single central bank and a single fiscal authority

1.2.1 The relevance of the lower bound on nominal interest rates

The lower bound on nominal interest rates may constrain the ability of monetary policy to achieve price stability. When policy rates are at or near their lower bound, the central bank can impinge on long-term interest rates and the availability of credit in the economy via forward guidance and asset purchase or lending programmes. While such unconventional monetary policy affects economic activity and the price level,[6] its effects may be limited if long-term rates are near zero and financial markets are functioning smoothly to begin with. Medium and long-term inflation expectations may then fall persistently. The economy may settle into a "low inflation trap" or a "liquidity trap" in which short and long rates are near the lower bound and inflation is below levels consistent with price stability.[7] Output and employment outcomes can then be expected to deteriorate, because monetary policy will have little room to respond to recessionary shocks when they occur.[8]

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3 There is a vast literature on monetary policy via short-term interest rate policy in this setting, with fiscal policy typically left in the background, automatically supporting the monetary stance by stabilising the level of public debt in response to policy rate changes. Woodford (2003) gives a textbook exposition.

4 See, for example, European Central Bank (2011), page 32: "Fiscal policies have a significant impact on economic growth and inflation through a number of channels. (…) Unbalanced public finances may result in demand and inflationary pressures (…)." Sargent and Wallace (1981) present a classic model of fiscal dominance: the central bank takes (excessive) budget deficits as given, which leads to (excessive) inflation. By contrast, under "monetary dominance" the central bank is not constrained by budgetary requirements.

5 See also Corsetti et al. (2019) for a recent review covering some of the issues discussed below in Sections 1.2 and 1.3.

6 On the effectiveness of the ECB's unconventional monetary policy, see Rostagno et al. (2019).

7 See Benhabib et al. (2001).

8 See Arias et al. (2016). See Work stream on the price stability objective (2021).

How frequently the economy finds itself near the lower bound is critically dependent on the natural rate of interest. The natural rate of interest is mainly affected by structural factors, which are generally outside the control of the central bank. It is defined as the hypothetical real interest rate that would prevail in the absence of nominal rigidities (sticky prices and wages) in the economy. In benchmark models, in which the central bank sets the policy rate so that the actual real rate equals the natural rate, the outcome is price stability and balanced growth (output equal to potential output). When the natural rate is negative, however, the required policy rate could turn out to be below the effective lower bound (i.e. infeasible). Setting the policy rate equal to the effective lower bound (ELB) would then produce inflation below levels consistent with price stability and a negative output gap (output below potential output). Even if the natural rate is positive in the medium term (but close to zero), it can fall significantly below zero after a contractionary disturbance.[9]

The evidence suggests that the natural rate has been trending downwards and may remain low in the foreseeable future. Although it has always been associated with considerable uncertainty, a typical estimate of the natural rate was as high as 3-4% per annum 20 years ago, and has since fallen to zero or below. The natural rate varies over time because of changes in the economy's potential growth rate, the propensity to save (driven, among other factors, by demography, wealth inequality and precautionary saving behaviour), fiscal policy, and the liquidity or safety premia associated with public sector liabilities. Some of the sources of the fluctuations in the natural rate may be very persistent.[10]

1.2.2 Fiscal policy as a macroeconomic stabilisation tool near the lower bound

Fiscal policy, in conjunction with monetary policy, can have a more significant impact on the economy precisely when the effectiveness of monetary policy alone may be constrained by the lower bound. A rise in government consumption or investment, a consumption tax cut or an increase in government transfers are likely to have larger multiplier effects near the lower bound than further away from it. Such fiscal interventions may be expected to raise aggregate demand, output and inflation to some extent, under any circumstances. In "normal times", away from the lower bound and with an output gap near zero, monetary policy is likely to (at least eventually) respond to an increase in expected inflation caused by a fiscal expansion by raising policy rates more than one-for-one. Real interest rates will then rise, crowding out private consumption and investment. By contrast, an increase in expected inflation with unchanged policy rates at the lower bound *reduces* real rates.

9 See Coenen et al. (2020).

10 See Laubach and Williams (2003), Holston et al. (2017), European Central Bank (2018) and Rachel and Summers (2019). For models of persistent sources of the fluctuations in the natural rate see Eggertsson et al. (2019) and Rachel and Summers (2019).

Thus, at the lower bound a fiscal expansion *crowds in* private consumption and investment, which raises its multiplier effect on aggregate demand and output.[11,12]

How a fiscal policy intervention affects the economy also depends on (expectations regarding) future fiscal policy. When investors, firms and households see budget deficits, they form expectations regarding future fiscal policy. They might ask themselves whether the rise in public sector liabilities is permanent or whether it will be reversed (backed) by future tax increases and spending cuts. In the former case the effects of a given current deficit on aggregate demand may be greater than they would be in the latter.[13] In particular, an increase in public sector liabilities that is not backed by future primary budget surpluses could help the economy escape from a low-inflation trap.[14]

The heterogeneity of households and firms is generally significant in the design of fiscal policy interventions and may be important for the monetary-fiscal policy mix. Fiscal policymakers are able, in principle, to design policies that target a specific subset of households or firms. As an example, macroeconomic models with heterogeneous agents suggest that the effects on aggregate demand of a budgetary transfer policy are likely to be greater if the transfer targets households that have a high marginal propensity to consume.[15] Households seeking to smooth consumption but which have a low level of savings and are unable to borrow typically spend a larger share of any increase in their disposable income – they have a higher marginal propensity to consume – than wealthy households which have ample savings and are able to borrow. Agent heterogeneity may also affect the design of the monetary-fiscal policy mix. Different combinations of monetary and fiscal policy measures (for instance, asset purchases by the central bank versus a targeted budgetary transfer policy) may achieve similar growth and inflation outcomes, while being associated with stronger or weaker additional effects on risk taking in financial markets, wealth, income and consumption inequality, the natural rate of interest, and other variables.

Because of agent heterogeneity, fiscal policy may be more effective than monetary policy after certain types of disturbance (such as the COVID-19 pandemic). A pandemic is different from a typical demand or supply-type business cycle shock, primarily because this kind of public health disturbance only leads to a contraction in economic activity in *some* sectors of the economy, while other sectors can, in principle, continue more or less unaffected. In this scenario the most effective

11 See Christiano et al. (2011), Eggertsson (2011), Woodford (2011) and Schmidt (2013). Leeper et al. (2017) fit a DSGE model with a rich fiscal sector to US data. While their estimate of the short-run fiscal multiplier averages 1.3, at the lower bound it ranges between 1.5 and 2.1.

12 Tax policy may also substitute interest rate policy to change real interest rates (the cost of current consumption in terms of future consumption), even in the case of balanced budgets. See Feldstein (2002) and Correia et al. (2013).

13 This transmission mechanism of fiscal policy is emphasised in the fiscal theory of the price level. See Sims (2016), page 315: "…fiscal expansion is not the same thing as deficit finance. It requires deficits aimed at, and conditioned on, generating inflation. The deficits must be seen as financed by future inflation, not by future taxes or spending cuts." See also Bianchi et al. (2020) and Cochrane (2021). *What kind* of future taxes or spending cuts are expected to follow, and *when*, may also shape the short-run effects of deficit finance.

14 See Benhabib et al. (2002), Woodford (2003) and Jarociński and Maćkowiak (2018). The incidence of lower bound episodes may diminish if agents expect a countercyclical fiscal response once an episode occurs. See Schmidt (2017).

15 Oh and Reis (2012), Bilbiie et al. (2013), Auclert et al. (2018).

economic policy may be a social insurance or transfer policy, with the central bank providing support, rather than a general monetary or fiscal stimulus.[16] More traditional monetary (and fiscal) policy measures may be necessary after the pandemic has subsided, depending on the extent to which private expenditure has failed to recover on its own.

Fiscal policy may also provide tools for avoiding a "secular stagnation". When the long-run natural rate is low, the lower bound constraint on monetary policy is likely to bind frequently – not only in the face of sizeable adverse shocks. The level of the (long-run) natural rate is affected by fiscal policy, among other things. Models of secular stagnation suggest that a permanent increase in government debt, redistributive policies, and a temporary increase in government purchases, may succeed in raising the long-run natural rate enough to ensure that for the economy a binding lower bound is the exception rather than the rule.[17] Automatic stabilisers and progressive taxation may reduce the precautionary demand for safe assets, thus raising the natural rate and providing more space for monetary policy (see Box 1).

Box 1

Understanding the impact of fiscal policy on monetary policy transmission in a HANK model with a lower bound

Heterogeneous-agent New Keynesian (HANK) models offer a natural environment for the analysis of interactions between fiscal and monetary policies. These models introduce realistic features, such as incomplete markets and income and wealth heterogeneity, which are especially suited to the analysis of policies entailing a significant degree of redistribution.[18]

This box explores the links between fiscal policy, long-run rates and monetary policy. To this end, we employ the HANK model of Fernández-Villaverde et al. (2021). This New Keynesian model features incomplete markets and idiosyncratic income shocks, so households are heterogeneous in their income and wealth levels. The model also includes progressive taxation, aggregate demand shocks and a zero lower bound for nominal interest rates. The focus is on the role of progressive taxation. We compare two economies with identical, constant levels of debt and taxes, but which differ in how the tax burden is shared among households. The first is calibrated to approximately replicate the levels of tax progressivity in the United States while the second imposes a flat tax: everyone is taxed at the same rate irrespective of their income.

Table A

Key model statistics under alternative tax schemes

(percentages)

	Frequency of spells at the zero lower bound	Average real interest rates
Progressive taxation	3.6	1.1
Flat tax	10.7	0.8

16 See Woodford (2020). See also Baqaee and Farhi (2020) and Guerrieri et al. (2020).

17 See Eggertsson et al. (2019), Mian et al. (2020) and Michau (2020).

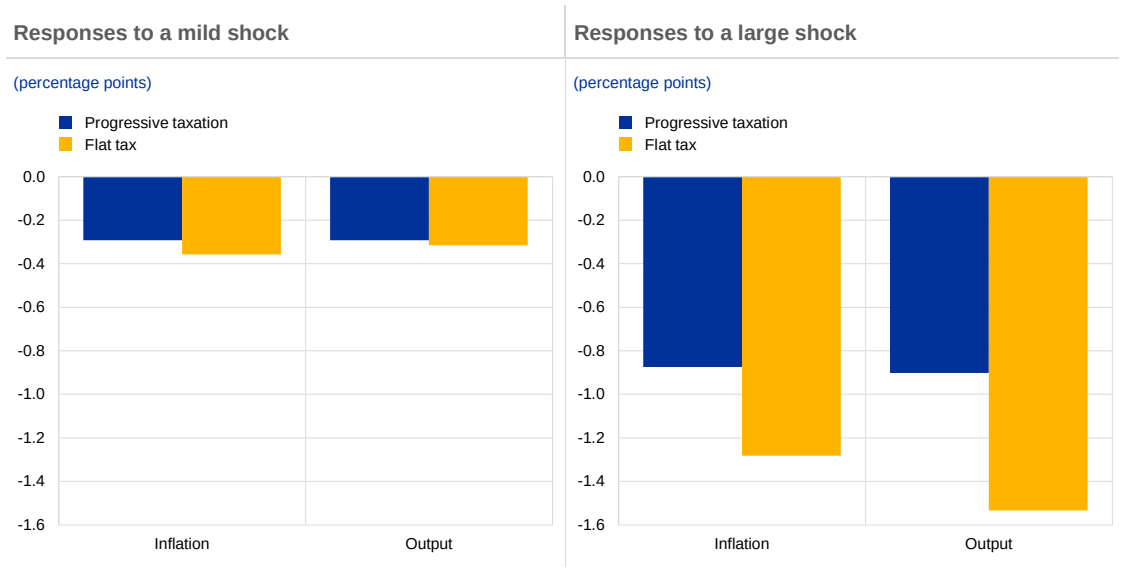
18 The interactions between monetary and fiscal policies in HANK economies has been analysed, among others, by McKay and Reis (2016), Kaplan et al. (2018) and Sterk and Tenreyro (2018).

Tax progressivity reduces the frequency of spells at the zero lower bound by increasing long-run real rates. Table A compares the effects of tax progressivity on the response of the economy to exogenous demand shocks. Zero lower bound episodes occur much less frequently in the case of progressive taxation than for a flat tax. This is mainly because of the higher long-run real rate in the former case, which increases the distance from zero for nominal interest rates. The increase in real rates in the case of progressive taxation is a direct consequence of the lower level of precautionary savings. As the fiscal system provides more insurance against aggregate and idiosyncratic risk, households need to save less to self-insure, thus reducing aggregate demand for risk-free assets and raising long-run real rates.

Monetary policy is more constrained when taxation is less progressive, thus amplifying the negative effects of recessions. Chart A displays the decline in output and inflation after a demand shock. In the case of small recessions the responses are roughly similar. However, for larger recessions the decline in both output and prices is amplified in the case of flat taxes. This is because there is reduced policy space for nominal rates in this case, which limits the capacity of monetary policy to provide a countercyclical demand stimulus. The higher average real rate in the case of progressive taxation, by contrast, allows monetary policy to better cushion negative demand shocks.

Chart A

Responses to a demand shock



Source: Author´s computations based on the model of Fernández-Villaverde et al. (2021).
Note: Value after one quarter of the impulse response to a negative 1-standard deviation demand shock (mild recession) or a 3-standard deviation demand shock (large recession).

Summing up these results, even in the absence of an active countercyclical fiscal policy the design of fiscal instruments has a major impact on the monetary policy space. The results emphasise how contingent the monetary policy stance is on the fiscal environment, so the latter should be carefully monitored. An important caveat is that our analysis does not prescribe an optimal level of tax progressivity, as it does not take into account the potential negative effects of progressive taxation, such as changes in incentives in the labour market.

1.2.3 Monetary-fiscal policy interactions with large public debt

The dynamics of public debt depend, among other things, on interest rates and the economy's growth rate. If the interest rate on public debt is, and continues to be, lower than the economy's growth rate (r-g<0), the government can run a given primary deficit forever and the debt-to-GDP ratio will remain stable.[19] This property is fragile, however, as future interest rates and growth rates are uncertain. If the interest rate exceeds the growth rate (r-g>0) the government must, at least at some point, run primary surpluses, to stabilise the debt-to-GDP ratio. The required primary surpluses are larger, the higher the stock of debt accumulated by the government. Furthermore, interest rates and growth rates are endogenous variables that respond to fiscal policy. In particular, the sign of the inequality may switch (from r-g<0 to r-g>0) precisely because the stock of public debt is growing (the interest rates on public debt may then be expected to rise).

When public debt is large, a self-fulfilling crisis may result. Investors may coordinate their expectations on the anticipation of a restructuring or default, demanding higher yields on government bonds. In the face of rising debt service costs the government may restructure or default on its debt obligations, validating the expectations.[20] To prevent the economy from falling into this undesirable equilibrium, the central bank may act as a backstop by standing ready to purchase government bonds.[21] Financial institutions may be subject to similar self-fulfilling runs, and runs on financial institutions and the fiscal authority may occur in parallel, each precipitating the other (a "doom loop").[22]

What adjustment is socially optimal in response to (large) increases in public debt? Since taxes are distortionary, smoothing tax rates over time and countercyclicality of inflation are beneficial from a fiscal perspective. The tax smoothing principle calls for reducing public debt slowly, and needs to be weighed against the desire to decrease debt faster as a precaution against possible future adverse shocks. Government policies that stimulate long-term growth are helpful, because faster growth implies larger primary surpluses for given tax rates. Higher inflation reduces the required primary surpluses, and in some cases higher inflation may be consistent with medium-term price stability (if higher inflation is temporary or if inflation is below levels consistent with price stability to begin with).[23]

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19 The case *r-g<0* has attracted attention because interest rates on public debt have been persistently low – essentially the same phenomenon as the secular decline in the natural rate. See Blanchard (2019), Sims (2019), Barthélemy et al. (2019) and Reis (2020).

20 The crisis may be a rollover problem, as in Cole and Kehoe (2000), or "a slow-moving debt crisis", as in Lorenzoni and Werning (2019).

21 See Corsetti and Dedola (2016). A self-fulfilling crisis – a multiple-equilibria phenomenon – should be distinguished from debt restructuring or default as a unique equilibrium outcome. The effect of the backstop on the government's incentive to take actions that improve economic resilience to fiscal stress depends on how the backstop affects the expected future benefits deriving from these actions.

22 On bank runs and the doom loop, see Diamond and Dybvig (1983) and Farhi and Tirole (2018) respectively.

23 With regard to optimal fiscal policy, see Barro (1979) and Sims (2013), who discusses the role of inflation. See also Nuño and Thomas (2019), Röttger (2019) and Arellano et al. (2020) for models of monetary policy and public debt sustainability.

1.2.4 Large central bank balance sheets

Balance sheet losses may, in some circumstances, affect the central bank's ability to achieve price stability. The value of the central bank's assets may fluctuate due to interest rate, credit and exchange rate or other relative price risk.[24] Through an intertemporal budget relation, the value of assets net of liabilities plus the present value of seigniorage must be equal to the present value of dividend payments to owners (taxpayers). It follows that a fall in the value of assets must be matched by some combination of an increase in seigniorage and a decrease in dividends, in expected present value terms.[25] An increase in seigniorage may be inconsistent with price stability.

To explore how the balance sheet, price stability and fiscal policy interact, it may be helpful to consider three stylised scenarios. In each case, let us assume there is an unanticipated decrease in the value of assets held by the central bank and consider what happens subsequently. In the first case, the present value of dividends falls while seigniorage remains unchanged, and there are no consequences for price stability. In the second case, the present value of dividends turns negative (a transfer from taxpayers to the central bank) and, once again, there are no consequences for price stability – the literature refers to this case as "fiscal support" for the central bank. Finally, in the third case, seigniorage rises beyond a level consistent with price stability, with fiscal support unavailable (and the present value of dividends equal to zero). In general, the likelihood of the central bank incurring a large loss rises with the stock of assets that are subject to risk. Furthermore, it is uncertain what amount of seigniorage will be consistent with price stability in the future.[26] See Box 2 below for further discussion of the link between the central bank's balance sheet and price stability.

Box 2

Central bank solvency and mechanisms for safeguarding central bank independence: a brief literature review

The economic literature has identified two main forces that can make it impossible for the central bank to achieve its objectives. First, under a regime traditionally referred to as fiscal dominance, if government debt is on an unsustainable path, the monetary authority can depart from its primary objective (i.e. maintaining price stability) in order to avoid a sovereign default. As discussed in Section 1.1, the solvency of the consolidated public sector imposes restrictions on fiscal and monetary policies – monetary dominance is necessary to ensure central bank independence. Some of the literature refers to a similar economic mechanism using different terminology, underlining the need for fiscal backing or fiscal requirements for price stability. Second, focusing more narrowly on balance sheet aspects, without fiscal support the central bank may fail to achieve its objectives,

[24] Assets are claims on domestic private agents, the fiscal authority and the rest of the world as well as gold. Liabilities are remunerated reserves (and any other interest-bearing liabilities). Seigniorage is the revenue from the issuance of non-interest-bearing currency (and reserves).

[25] These statements apply regardless of the accounting practices followed. See also Box 2.

[26] See Del Negro and Sims (2015), who explain that "fiscal support" should be distinguished from "fiscal backing", in order to rule out situations in which private agents coordinate their expectations on explosive inflation. See also Carpenter et al. (2013), Hall and Reis (2015) and Barthélemy and Penalver (2020).

even if the solvency of the consolidated public sector is not at risk, because of financial losses and a subsequent lack of fiscal transfers. This box examines the second economic force, discussing some mechanisms that may be used to safeguard the central bank's independence in conducting monetary policy, both in the case of a single economy and in the case of a monetary union.

1. Central bank financial soundness and fiscal support: single economy aspects

The central bank is truly independent and there is no fiscal obstacle to price stability in any state of the world if the fiscal authority is also committed to ensuring the central bank's solvency. If the fiscal authority credibly commits to providing such fiscal support, i.e. to providing financial transfers to the central bank, guaranteeing its solvency whenever needed, only the consolidated budget constraint is relevant.

Without fiscal support the central bank may fail to implement its desired policy, as the fiscal and monetary authorities need to satisfy different budget constraints. The central bank's intertemporal budget constraint, when conventionally interpreted, states that the present value of future dividends is equal to the current central bank's net equity (assets minus interest-bearing liabilities) plus the present value of future seigniorage revenues. Hence, from an intertemporal perspective, risks to central bank policy solvency may arise if the present value of future seigniorage revenues is perceived to be lower than the current stock of interest-bearing liabilities net of the central bank's assets. The theoretical literature has often focused on this extreme version of intertemporal insolvency, which seems unlikely to occur in the short term (at least in most advanced economies). However, this calls for an economic assessment of the central bank's financial buffers, although this kind of assessment is not disclosed in standard accounting statements and is not consensual, in particular with regard to the expected level of future seigniorage revenues.

From a purely accounting perspective, it is not uncommon for central banks to post negative profits and there are examples of central banks with negative net equity positions, which may raise credibility concerns, even if they might still qualify as solvent from an intertemporal perspective. The literature has also proposed some alternative, more restrictive, definitions of central bank insolvency, which help bridge the gap between the economic and the accounting perspectives. Period insolvency assumes an extreme lack of fiscal support in which the fiscal authority refuses to compensate the central bank for any negative profit, even via future retained earnings, which means that the central bank becomes insolvent as soon as it posts a negative profit. Rules insolvency is an intermediate case that relies on the central bank staying committed to the dividend distribution rule foreseen in its relationship with the Treasury. It is equivalent to period insolvency if the rule implies that dividends can never be negative and cannot be used to offset previous losses. It is equivalent to intertemporal insolvency if the rule makes it possible to build a deferred account of accumulated losses – to be offset by future profits – up to the level of the central bank's net equity plus the present value of future seigniorage revenues.

Independently of the definition of insolvency used, there may be instances in which the central bank requires the fiscal support of the fiscal authority. If this occurs and there is no mechanism for recapitalising the central bank, the bank may lose credibility and may be unable to fulfil its mandate. In the more extreme cases, agents may be reluctant to continue holding the central bank's reserves, leading to high inflation (and possibly currency depreciation), and the central bank will have no instruments it can deploy to counteract this loss in confidence.

Fiscal support mechanisms have not been made explicit in most advanced economies and may be difficult to guarantee in practice. One concrete way to implement fiscal support could be to set up a rule that transfers any central bank profits – including negative profits – to the fiscal authority. The closest example of this is probably the recent reformulation of Bank of England's capital framework. In June 2018, the Treasury agreed to establish a corridor system for the loss-absorbing capital of the Bank, whereby the latter would receive a capital injection from the former if capital dropped below a certain threshold. Such a rule is rarely observed in other countries, and central bank recapitalisations can be politically costly. As the central bank's profits are usually positive and tend to grow large, the fiscal authority may be tempted to commit to a certain level of public expenditure and may therefore not be willing to accept a large reduction in the central bank's dividends – much less accept the imposition of a fiscal transfer (negative dividend).

The literature has proposed other mechanisms for minimising central bank insolvency risk. The following complementary policies can be put in place by the central bank to make it less dependent on the fiscal authority's willingness to provide fiscal support: (i) prudent risk management (especially vis-à-vis aggregate credit risk) to minimise losses on the central bank's portfolio; (ii) building financial buffers to deal with future crises, including through retained earnings, in particular when there is a large duration mismatch between the central bank's assets and liabilities or when the central bank assumes sizeable credit risks in its balance sheet; (iii) setting up deferred accounts, whereby the central bank's losses could be offset by future profits; (iv) obtaining guarantees from the fiscal authority with regard to the coverage of specific or even general central bank losses or holding the central bank's risky assets in an account that is fully indemnified by the fiscal authority (e.g. the Federal Reserve System and the Bank of England in the context of some of the responses to the COVID-19 pandemic), which would, in essence, imply some form of fiscal support, without relying on discretionary transfers.

2. Additional constraints and complexities in a monetary union

Additional challenges to guaranteeing central bank independence emerge in a monetary union. In general, there are many possible policy arrangements that can ensure union-wide fiscal backing, although some of these are more politically fragile than others. First, the fiscal framework can specify that each fiscal authority is responsible for stabilising its own level of debt by adjusting its primary surplus over time. This is in line with the notion of monetary dominance used in Section 1.3.1 to characterise a monetary union consisting of a single central bank and many decentralised fiscal authorities. Second, a central fiscal authority can ensure fiscal backing if that authority can freely determine policies for raising and cutting primary surpluses within an agreed framework. Third, any fiscal authority can take action seeking to stabilise not only its own level of debt, but also the aggregate level of debt. The first two arrangements depend on the degree of completeness of the monetary union. The last arrangement is the least stable as it may result in the public debt levels of some member countries taking diverging paths. This would, in principle, challenge the coherence of the monetary union.

Even if there is a mechanism specifying the extent to which risks are shared between national central banks (NCBs) and even if there are fiscal requirements ensuring debt sustainability, fiscal support is still needed to remove fiscal obstacles to price stability. In the absence of risk sharing between central banks and assuming there are no transfers (or a limited number of transfers) between governments, public sector budget constraints between member countries will remain largely separate – similar to the situation for single economies. Risk sharing between central banks creates a link between these budget constraints, even if there are no transfers between

governments. In reality interim constellations are likely to prevail. In any case, for any degree of risk sharing between central banks uncertainty over fiscal support can be detrimental, as the fear of balance sheet losses should not limit the actions of independent central banks, especially in respect of their role of lender of last resort. Other tools mentioned earlier used to mitigate the risk of insolvency can be particularly useful in the case of a monetary union.

Choosing the appropriate amount of risk sharing is a complicated decision and is linked to the overall degree of completeness of the fiscal governance framework prevailing in a monetary union. On the one hand, full risk sharing acts as an insurance mechanism and underlines the "singleness" of monetary policy, although it may provide adverse incentives in a monetary union of ultimately sovereign member countries. On the other hand, no risk sharing can provide proper incentives in incomplete monetary unions, although it may preclude fiscal support in practice, if more fragile central banks face risks that are highly correlated with those of the national fiscal authority. While full risk sharing seems a natural benchmark for complete monetary unions, in the case of incomplete monetary unions some form of limited risk sharing for certain operations may strike an appropriate balance.

1.3 Aspects of monetary-fiscal policy interactions specific to monetary unions (characterised by a single central bank and many fiscal authorities)

This section identifies conceptual aspects of monetary-fiscal policy interactions that are specific to monetary unions (which are not also fiscal unions) characterised by a single central bank and many decentralised fiscal authorities, with debt issued in a common currency. The benchmark setting considered in this section does not cover features of fiscal unions (such as cross-country fiscal transfer schemes or a central fiscal capacity).[27] The discussion expands on the previous section, the objective being to set the stage for a meaningful discussion of developments and challenges related to the euro area in subsequent parts of the report.

1.3.1 Central bank independence and the need for a fiscal framework

A monetary union with a single central bank and many fiscal authorities reinforces the case for central bank independence. At the same time, the ability of monetary and fiscal policies to act together when needed poses a specific challenge. These propositions reflect the fact that the existence of many fiscal authorities creates additional challenges with regard to reaping the benefits of

[27] This benchmark is in line with the taxonomy of a stylised monetary union with a single monetary policy and many fiscal policies, as discussed by Uhlig (2003). Some aspects of fiscal unions are briefly touched on in subsection 1.3.4. In line with the mandate of the report, forward-looking policy discussions in subsequent sections take the current institutional setting of EMU as a given. The concluding section of the report offers observations on the benefits deriving from institutional reforms.

cooperation and commitment, compared with a "single economy" setting.[28] In a monetary union, a regime of monetary dominance therefore makes it necessary to have a strong complementary fiscal framework, lending support to the price stability objective of the single monetary policy (or any other objective of the central bank) at the union level.[29]

From a monetary policy perspective, it is particularly important for the framework to address fiscal externalities which affect the ability of the single monetary policy to achieve its objective using uniform instruments. Two especially relevant externalities affect the fiscal sustainability dimension (via a debt externality) and the fiscal stabilisation dimension (via a demand externality). These are now addressed in turn.[30]

First, relative to a cooperative benchmark, government debt levels of the member countries in a monetary union will tend to be too high (debt externality). This insight reflects the fact that under non-cooperative, self-oriented policies each fiscal authority has an incentive to issue too much debt, speculating that the single monetary authority may eventually respond to high average debt by accepting union-wide higher inflation. This behaviour is supported by an externality, as the costs associated with fiscal consolidation are incurred predominantly at the national level, while the costs associated with higher inflation tend to be shared by all countries. Hence, non-cooperating fiscal authorities tend to get a free ride vis-à-vis supranational monetary policy.[31] If rationally anticipated this behaviour can therefore lead to inefficient outcomes of too much debt, too high inflation and too low levels of output. The central bank can be protected against this externality by a common fiscal framework, supported by credible commitments made by all authorities, that constrains the amount of debt that the governments of union members can issue, combining quantitative thresholds with appropriate incentive-compatible mechanisms to sustain such thresholds.[32] Empirically, the strength of this externality depends over time on many macroeconomic and structural factors which determine the

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28 Cooperative outcomes internalise the externalities affecting the various players, thereby improving on welfare-inferior outcomes under purely self-oriented (Nash) behaviour. Commitment helps to maintain good outcomes over time and requires policymakers to be able to commit credibly in advance to action plans, stabilising the expectations of the private sector.

29 The distinction between regimes of monetary dominance and fiscal dominance is due to Sargent and Wallace (1981). "Dominance" here only refers to the control of inflation, and not to outcomes in any other policy areas (e.g. financial market aspects or employment). For a rich intertemporal general equilibrium discussion of fiscal requirements, which contends that a suitable monetary policy rule can ensure price stability, see Woodford (2001).

30 See Blanchard et al. (2021) for this classification.

31 This free-riding mechanism typically worsens as the number of (similar) countries gets larger.

32 For a generic analysis of time consistency issues and cooperation problems in a monetary union, see Chari and Kehoe (2008). Similarly, see Aguiar et al. (2015), who focus on the ability of governments to commit, as discussed further below. In related work, Beetsma and Uhlig (1999) emphasise political economy aspects related to the different time horizons of monetary and fiscal policymakers, while Dixit and Lambertini (2001) consider the role of policymakers' potentially conflicting output and inflation goals. For an explanation of fiscal rules in a monetary union from a fiscal theory perspective, see Bergin (2000). Relevant empirical evidence of debt constraints on regional governments in countries which act as a monetary union can be found in von Hagen and Eichengreen (1996). Blanchard et al. (2021) discuss whether suitable outcomes for fiscal policies should be enforced via state-contingent rules or standards (adjudicated by independent bodies). Basso and Costain (2017) argue that the delegation of fiscal instruments to an independent European authority could ensure debt sustainability, while making countercyclical fiscal stabilisation possible.

soundness of outstanding debt including, among others, the magnitude of the r-g-difference.

Second, relative to a cooperative benchmark, the fiscal stabilisation efforts of member countries in a monetary union will be sub-optimally aligned (demand externality). Once again, this outcome is supported by an externality as changes in aggregate demand via variations of fiscal policy are decided and funded at country level, while the associated benefits are enjoyed partly by other countries, and are transmitted via spillovers in integrated markets.

The debt and demand externalities depend in their relative strength not only on the degree of integration and the size of member countries, but also on the time-varying nature of the state of the economy. These externalities (like any further externality) can operate well in different directions. For example, it is a priori unclear whether debt-financed fiscal stimulus under self-oriented policies will lead to "too much debt" or "too little stimulus", also given the dynamics of political economy. A well-designed common fiscal policy framework is needed to internalise and balance these effects in a state-dependent manner. The framework should ensure that efficient and sufficiently countercyclical stabilisation cannot endanger the sustainability of public finances, which is consistent with the price stability objective of the central bank.

1.3.2 Policy mix in unconstrained environments vs. persistent lower bound episodes

Lower bound episodes illustrate the time-varying nature of the strength and the interaction of the debt and the demand externality. The demand externality becomes relatively more important, which also has implications for monetary policy. The degree of coordination of fiscal policies at country level matters for the single monetary policy to the extent that this affects the aggregate fiscal stance. However, the implications for monetary policy of insufficiently coordinated fiscal outcomes can vary, depending on the state of the economy. In unconstrained environments, in which short-term policy rates are set by the central bank sufficiently far away from the lower bound, the single monetary policy may be able to achieve its price stability objective even if the cyclical fiscal stance of countries is not coordinated and debt levels may show significant, but sustainable, differences. However, when confronted by lasting lower bound episodes and persistent inflation undershooting, the effectiveness of monetary policy may depend on the ability of the fiscal framework to provide appropriately coordinated and efficient fiscal stabilisation, supported by strong fiscal multipliers at unchanged policy rates (as prevailing at the lower bound). At the same time, low policy rates can support governments via lower borrowing costs. Therefore, during lasting lower bound episodes there is scope for a constellation – known as strategic complementarity – in which monetary and fiscal

policies can mutually create policy space for each other.[33] Moreover, during such episodes a lack of efficient stabilisation can create adverse feedback to the debt externality, as lasting and unexpected periods of low inflation tend to drive up outstanding amounts of government debt in real terms. Box 3 illustrates an intermediate case: it studies, for a stylised monetary union, the effectiveness of monetary policy when augmented by non-standard measures at the lower bound.

The benefits stemming from a coordinated fiscal response during lower bound episodes can be greater if member countries have asymmetric fiscal starting positions. Specifically, different intensities of demand-led fiscal support at country level (reflecting, among other things, differences in fiscal space) can help to facilitate adjustments of relative prices and the relative competitiveness of member countries.[34]

There are further benefits deriving from a coordinated response during lower bound episodes. In particular, such a response can facilitate the adoption of growth-friendly and productivity-enhancing structural policies. Over time these policies will not only support income levels but will also help to lift the natural rate, thereby mitigating the likelihood of future lower bound episodes. Structural policies that support productivity and output growth can be more attractive if, during lasting lower bound episodes, monetary policy (with support from fiscal policies) can sustain inflation in line with the objective. For structural policies to be attractive it is critically important that their longer-term benefits (through positive income effects in anticipation of higher productivity and output levels) are not dominated by possible short-term costs during the political process.[35] As such policies typically tend to promote competition and more efficient allocations in labour and product markets, short-term costs can result from unaddressed downward pressure on prices. This can lead to below-par inflation and an unwelcome rise in real interest rates at the lower bound.[36]

Box 3

The conventional monetary and fiscal policy mix in a monetary union, with an extension to lower bound episodes

In a monetary union, monetary policy can maintain its effectiveness if short-term policy rates approach the value of zero, assuming a conventional mix of monetary and fiscal policies (in line with the assignments made under a regime of monetary dominance). As an illustration, this box

33 This concept is found in Cooper and John (1988). In the context discussed here, in unconstrained environments (away from the lower bound), monetary and fiscal policies can be seen as strategic substitutes, meaning that a more active use of one instrument tends to be offset by a less active use of the other. At the lower bound, monetary and fiscal policy instruments can become strategic complements, in the sense that a more active use of one instrument reinforces the benefits deriving from a more active use of the other. For details, see Bartsch et al. (2021).

34 See Blanchard et al. (2016).

35 For a discussion of this see Andrés et al. (2020), Andrés et al. (2017), Eggertsson et al. (2014), Forni et al. (2010). A broad-based approach is taken by Gaspar et al. (2016), also addressing reforms of financial markets and banking regulation, with the intention of making these sectors more resilient and improving the transmission of monetary policy.

36 Beyond shorter-term concerns, a coordinated response across countries should recognise the special role of nominal rigidities. These rigidities are responsible for the degree to which the lower bound constraint is binding as they prevent inflation from adjusting fast enough. Under sufficiently flexible prices the constraint would lose relevance. For a discussion of this see Fernández-Villaverde (2014).

draws on the two-country model of a monetary union developed by Bletzinger and von Thadden (2021), which extends a traditional new Keynesian framework by allowing for a portfolio balance channel. This channel is built on the assumption that sovereign debts of different maturities and from different countries are imperfect substitutes. The notion of a conventional policy mix is modelled in line with Leeper (1991). Monetary policy actively pursues price stability for the monetary union as a whole, following a Taylor-type rule for the choice of the common short-term interest rate. Fiscal policies are set independently by the governments in the two member countries through the application of passive feedback rules which preserve fiscal sustainability at the going price level in each of the two countries. If the portfolio balance channel is absent central bank purchases of long-term debt (quantitative easing, QE) become ineffective once the short-term interest rate reaches the zero lower bound constraint.[37] However, if the portfolio balance channel is present, monetary policy in the form of negative short-term interest rates (up to a certain endogenous lower bound) and QE become effective. The endogenous lower bound reflects the model feature that the combined return on a portfolio of short and long-term debt needs to stay non-negative. If it does not, banks will lose the ability to offer a return on household deposits which is not dominated by the return on real money balances.

For natural rate shocks of a certain size (which would drive the short-term interest rate below the value of zero), there may well exist an interest rate rule augmented by QE that replicates the outcomes under negative short-term rates prescribed by a conventional interest rate rule without QE. By design, negative policy rates affect the short end of the yield curve while QE affects longer-term yields. In any case, there is a limit to the effectiveness of the two types of non-standard monetary policy interventions (or combinations of the two), given the need to preserve non-negative deposit rates.

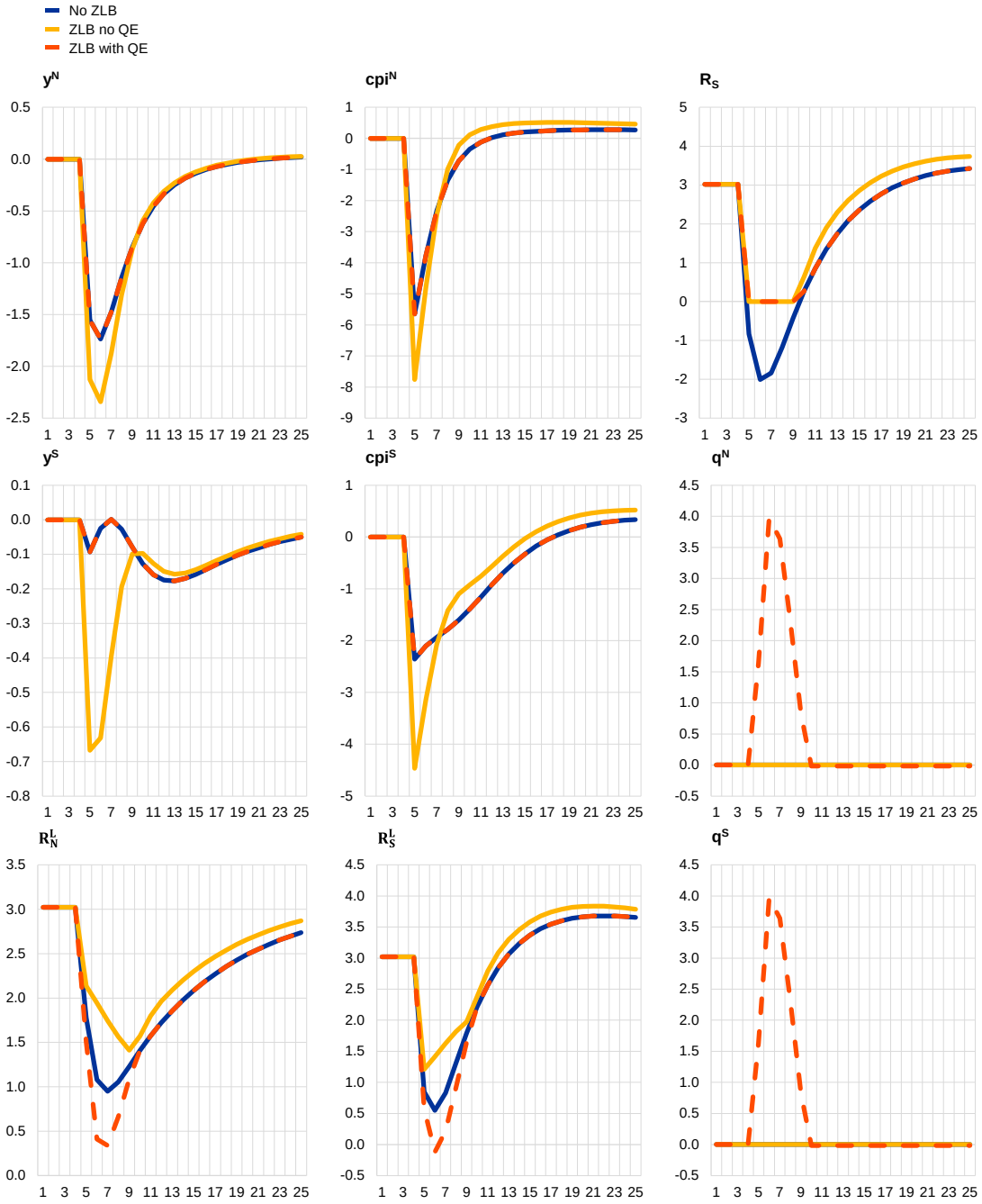
[37] For a more all-encompassing neutrality proposition beyond aspects of the lower bound see Wallace (1981).

Chart A

Impulse responses to an asymmetric demand-driven recession in a monetary union, leading to negative common short-term rates under the conventional interest rate rule

Results from a two-country New Keynesian DSGE model of a monetary union

(quarterly data, percentages)



Notes: Output gaps (y) in countries N and S are shown as percentage deviations from their steady-state values. CPI-inflation (cpi) and interest rates (R) for short-term and long-term debt are shown as annualised net nominal levels in percentages. QE purchases (q) are shown as level deviations from the steady-state value of zero. QE purchases are calibrated so as to replicate the outcome under the scenario of negative interest rates. The natural rate shock materialises (unexpectedly) in period t=5. For details see Bletzinger and von Thadden (2021). ZLB stand for zero lower bound.

This reasoning applies not only to a symmetric monetary union scenario (two identical economies), but also generalises to asymmetric monetary unions, which are characterised by asymmetric

shocks or asymmetric structures. If asymmetries between the two countries result only from shocks of different size, the outcomes achievable under a common negative short-term rate may be replicable through use of a rule augmented by a symmetric design of QE, involving identical per capita central bank purchases of long-term debt issued in the two countries. This finding reflects the assumption that negative rates and QE are substitutable. Chart A illustrates this finding and considers an asymmetric natural rate shock that affects country N more strongly than country S. By contrast, asymmetric structures affecting the transmission of monetary policy can translate into an asymmetric QE design.

For sufficiently large shocks, the constraint on the non-negativity of deposit rates becomes binding. While such large shocks would render further rate cuts infeasible or more QE ineffective, monetary policy can still rely on the forward guidance channel by promising to keep the short-term rate "low for longer" in the spirit of Eggertsson and Woodford (2003).

Alternatively, expansionary fiscal policies can help to stimulate output and inflation. This is plausible if the assumption is maintained that both governments pursue fiscal rules which always preserve sustainability. The role of fiscal policies in a monetary union becomes more complicated if one allows for strategic interactions, weak commitment and the risk of default. These aspects matter for the analysis of incomplete monetary unions, and their incorporation would lead to additional QE design considerations related, among other things, to incentive effects and risk-sharing modalities.

1.3.3 Vulnerabilities arising from asymmetric debt levels of member countries

In the absence of a fiscal union (which could allow for cross-country transfer schemes or a central fiscal capacity), fiscal and macroeconomic developments that lead over time to member countries having significantly different sovereign debt levels can create vulnerabilities which pose a challenge for the single monetary policy.

A monetary union which is not also a fiscal union creates a clear responsibility for member countries to make a credible commitment to preserving the sustainability of sovereign debt, supporting this with a strong fiscal framework. If debt levels nevertheless become over time significantly different this creates a challenge which is distinct from a constellation in which all countries have similarly high debt levels (as discussed in Section 1.2 for the reference setting of a "single economy"), as the asymmetry reveals a certain shortage of macroeconomic instruments.[38] This shortage is a result of the decision to give up sovereignty over monetary policy at country level, a feature which is prominently discussed, along with its costs and benefits, in the literature on optimal currency areas.[39] In view of this shortage, the

[38] Bianchi and Mondragon (2018) consider the lack of monetary autonomy in a model with sovereign default, rollover crises, foreign currency debt and nominal rigidities, addressing euro area developments. In general, the "singleness" of monetary policy with a mandate which covers union-wide developments creates a tension with monetary policy operations targeting needs at country level.

[39] This literature refers to Mundell (1961), stressing that optimal currency areas offer various benefits (linked, for example, to the reduction of transaction costs or the endogenous creation of integrated markets) which more than offset this loss.

fiscal policies of member countries in a monetary union have greater responsibility to respond to idiosyncratic shocks and support the stabilisation of business cycle fluctuations.[40] When these polices are implemented symmetrically over time and across all countries and when they are associated with similar growth patterns this is of no concern. However, a deficit bias not addressed in the fiscal framework, possibly reinforced by a lasting weakening of countries' growth performance, can lead to insufficient fiscal consolidation, creating over time a trade-off between stabilisation and sovereign debt sustainability concerns at country level.[41]

The trade-off between stabilisation and sovereign debt sustainability concerns at country level creates a specific vulnerability for member countries. It reflects the fact that the sovereign debt of countries belonging to a monetary union is issued in a common currency, thereby lacking a degree of backing that is available for single economies (where the single currency is under the control of the single sovereign). The vulnerability has two dimensions. First, for high-debt countries belonging to a monetary union the non-fundamental component of the valuation of government debt tends to be more fragile than it is in single economies. Consequently, if high-debt countries lack a sufficiently credible commitment to preserving sustainability their sovereign debt can, in principle, become more vulnerable to rollover risk and, within certain ranges, to belief-driven runs which could trigger an inefficient debt restructuring.[42] Second, the fragility of high debt levels, when left unaddressed over time by the national fiscal authorities and the fiscal framework, can lead to rising credit risk and fundamental solvency concerns. Identifying these two dimensions in real time can be a challenge.[43]

Both dimensions of this vulnerability are a matter of common concern which should be addressed in a monetary union. Member countries' government debt, while varying in terms of liquidity and credit risk premia, is issued and traded in integrated markets. Sovereign securities with comparable risk properties are typically close substitutes, although they are subject to potentially rapid and volatile portfolio adjustments in response to new information, with spillovers typically affecting all member countries across financial markets. Consequently, the vulnerability associated with country-specific high debt levels needs to be addressed in a

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40 See Cooper and Kempf (2004) for a discussion of the Mundellian trade-off for optimal currency areas in the presence of fiscal policies. Kempf and von Thadden (2013) compare monetary union models dealing with strategic interactions between monetary and fiscal policies, synthesising the assumptions with regard to policy objectives, independent instruments, and spillovers in the spirit of Tinbergen.

41 Persistent differences between groups of high-debt and low-debt countries can reflect a lack of symmetric adjustment captured not only by fiscal variables, but a broader set of imbalances (such as, among others, productive structures, unit labour costs, current account deficits and TARGET balances), inflation preferences and drivers of more domestically oriented or export-led growth models.

42 Aguiar et al. (2015) offer a monetary union model linking rollover crises to a lack of commitment. This leads to a reassessment of the optimal composition of countries forming a monetary union as "highly indebted economies prefer a monetary union in which a sizable fraction of members also have high debt, balancing commitment to low inflation against commitment to act as a lender of last resort". In the absence of rollover crises a high-debt country tends to be best served by joining a monetary union with low aggregate debt (see Alesina and Barro, 2002).

43 In this spirit, see Bocola and Dovis (2019), who study a setting in which interest rate spreads vary over time because of non-fundamental and fundamental risk. While these two types of risk have similar effects on interest rate spreads, they impact the maturity structure of sovereign debt differently – there is a lengthening of the maturity structure under rollover risk and a tightening under fundamental risk.

monetary union, requiring additional mechanisms from two angles, relative to the "single economy" setting.

With regard to the non-fundamental dimension of sovereign risk, in exceptional circumstances a targeted central bank backstop for solvent sovereigns may be needed to prevent liquidity runs turning into self-fulfilling (non-fundamental) threats to solvency.[44] Effective central bank communication or, if needed, explicit support can affect market sentiment and correct non-fundamental spreads, facilitating coordination on the sound equilibrium. Support can be designed in different ways, depending on the drivers and the severity of the underlying problem causing the instability. Relevant design parameters include, among others, the appropriate degree of risk sharing associated with central bank support or a commitment given by the central bank to intervene conditional on prior fiscal actions. In general, as it is difficult to distinguish between fundamentally justified and unjustified determinants of sovereign risk in real time, explicit central bank intervention also bears risks, as it may delay the necessary corrections and weaken overall fiscal discipline. At the same time, from the perspective of financial markets it needs to be factored in that a timely and targeted central bank intervention can help to reduce costly endogenous risk amplifications. This endogeneity creates an important link to the avoidance of financial dominance and goes beyond the aspects of coordination solely between monetary and fiscal policies.[45]

With regard to the fundamental dimension of sovereign risk, there is debate over the most appropriate course of fiscal action during extreme events. On the one hand, it is argued by some that it may become necessary during extreme events to consider a last resort fiscal mechanism that can correct, when this is unavoidable, unsustainable debt overhangs. The design of any such mechanism should be capable of supporting orderly procedures facilitating ex post efficient debt restructurings, possibly supported by contracts with adequate provisions and financial instruments with state-contingent pay-offs.[46] On the other hand, others emphasise the risks associated with such a mechanism when it is considered outside the context of the overall architecture. In this case, any simplistic debate over such a mechanism could potentially trigger a perverse spiral of self-fulfilling default expectations (this might, among other things, be related to misunderstandings on the part of markets). As a consequence, such mechanisms are often discussed together with well-defined sequences of reforms, combining aspects of risk sharing and risk reduction, with the intention of enhancing the resilience of monetary unions (see, on this, the report's concluding section on the benefits deriving from institutional reforms). In general, though, a correction of fundamental weaknesses should be first and foremost attained by making appropriate changes to the conduct of fiscal policies at country level and through economic growth.

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44 Corsetti and Dedola (2016) discuss central bank interventions which can eliminate, at certain levels of debt, self-fulfilling private investor runs on the fiscal authority followed by default.

45 See Brunnermeier (2016) and Brunnermeier and Reis (2019) with a focus on the particular fragility of sovereign debt in the multi-country setting of EMU.

46 Examples include debt-like instruments with a senior-junior structure or equity-type instruments, such as GDP-linked bonds. For an overview and a critical discussion, see Marimon and Cooley (eds.) (2018) and Leandro and Zettelmeyer (2019).

Overall, the reduction of vulnerabilities stemming from sovereign debt can help to unburden the single monetary policy. Fewer vulnerabilities can prevent inefficient debt restructurings and reduce the likelihood of unsustainable debt overhangs. Ideally, the institutional framework should aim at providing, in parallel, more risk sharing across borders and better incentives to encourage the sound conduct of fiscal policy, while also complementing market discipline, supported by risk-reduction measures.[47] One key intention is to unburden the single monetary policy, which is typically mandated to achieve price stability for the monetary union as a whole under all contingencies.

1.3.4 Incompleteness vs completeness of monetary unions

The role played by the institutional foundations of monetary unions in the effectiveness of monetary policy has been addressed in recent discussions on how institutionally incomplete monetary unions can be made more complete. Although the debate is of key importance for monetary policy, it is complex, as there is no unique blueprint at the political level indicating how to improve the institutional completeness of a monetary union of member countries which are ultimately sovereign. Ultimately, this depends on the willingness of countries to take steps towards achieving a political union. Nevertheless, the literature on fiscal-federal systems offers various recommendations on how to achieve deeper economic integration and better-functioning monetary unions.[48] On the fiscal side, relevant elements include, among other things, the objectives, the design and the funding of a central fiscal capacity (see also Box 4), the design of an effective governance structure for the fiscal policies of member countries, mechanisms to ensure a better-coordinated aggregate fiscal stance, and the role and the design of a common sovereign safe asset. Given the interdependence of the objectives to be achieved, proposals are typically presented as a package of reforms, the idea being to create significant complementarities between individual reform measures with a careful sequencing over time.[49]

Alongside fiscal reforms, improvements in the integration of financial markets which bolster private risk sharing can offer sizeable welfare benefits.[50] These benefits tend to be greater within monetary unions than they are for single economies in view of the previously discussed shortage of independent monetary policy at country level. However, even strong private risk sharing ("complete markets") may not be enough to fully overcome this instrument shortage, making

47 For a detailed explanation of this approach, covering a large range of applications, see Centre for Economic Policy Research (2018) and discussions in Tabellini (2018) as well as Pisani-Ferry and Zettelmeyer (2018). In general, subsequent literature has stressed the importance of a proper sequencing of reforms, balancing elements of risk-reduction and risk-sharing mechanisms over time.

48 In this spirit see, for example, Burriel et al. (2020b).

49 At a political level in Europe, a roadmap has been offered by the so-called "Five Presidents' Report" (European Commission, 2015) which outlines an all-encompassing perspective which goes well beyond fiscal aspects.

50 For an overview of aspects of public and private risk sharing, see Cimadomo et al. (2018).

additional government interventions via state-contingent transfers potentially useful.[51]

Box 4
Fiscal capacity in a monetary union

This box explores the welfare implications of a stylised fiscal capacity in a monetary union that is used for macroeconomic stabilisation through cross-country transfers.[52] The setting is a New Keynesian model of a monetary union consisting of two countries, "Home" and "Foreign". Each country is populated by optimising households, monopolistically competitive firms and a fiscal authority that always sets its budget balance to ensure that the public debt stabilises over time. There is one central bank, which sets the nominal interest rate with the aim of stabilising union-wide inflation. Finally, a central fiscal capacity can make transfers between the two countries, depending on their relative output gap.

The model allows for switches in the behaviour of the national fiscal authorities and the central fiscal capacity. First, governments might pursue more aggressive debt stabilisation above a certain debt-to-GDP ratio. This captures the experience of countries that, either because of financial market pressures or because of national fiscal rules have engaged in procyclical consolidation during an economic downturn. Second, access to the central fiscal capacity is conditional on the change in the debt-to-GDP ratio being below a certain threshold, which represents adherence to a union-wide fiscal rule. In both cases the transition probabilities between the different regimes depend on endogenous variables (the level of and the change in the debt-to-GDP ratio respectively). There is some uncertainty over changing the regime when the limit is exceeded, which captures non-linearities in the reaction of fiscal markets and the use of judgement in the application of fiscal rules.

Table A
Welfare effects of a central fiscal capacity

(consumption equivalents, percentages)

	1.Fiscal capacity (transfer elasticity = 0.1)	2.Fiscal capacity (transfer elasticity = 0.5)	3.As (1), but with greater trade openness	4.As (1), but with less price stickiness
Home	0.92	2.78	0.18	0.90
Foreign	0.80	-0.91	1.10	0.82
Monetary union	0.85	0.54	0.73	0.85

Note: Welfare compared with a baseline with switching in national fiscal policy and without a central fiscal capacity.

A central fiscal capacity can improve welfare in both countries. Table A shows the welfare gain associated with having a central fiscal capacity, compared with the baseline without one, if "Home" is hit by random (negative and positive) demand and productivity shocks and uses income taxes to stabilise its debt. Welfare is measured in consumption equivalents: a value of 1 means that household consumption would need to be higher in the baseline by an average of 1%, in every period, for it to be as well off as it would be with the central fiscal capacity. The welfare gain for

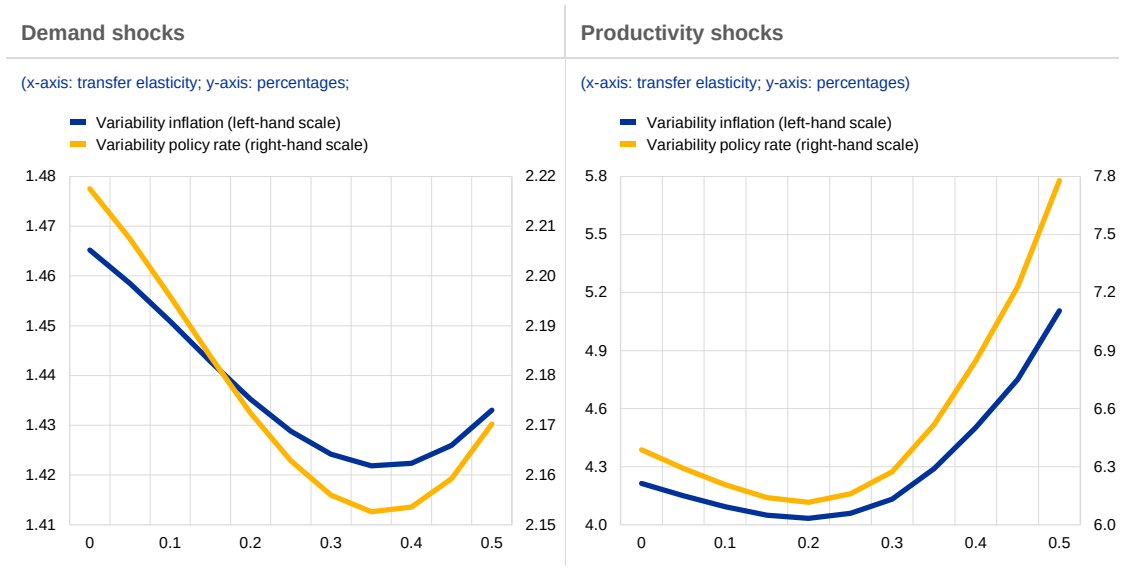
51 See Farhi and Werning (2017), who show that the benefits from such transfer schemes increase with the size and persistence of asymmetric shocks affecting member countries.

52 This box is based on Bonam et al. (2021). Other possible aspects of a central fiscal capacity, such as its design and other goals (e.g. the provision of public goods or economic convergence), are not covered in this analysis.

"Home" stems from the transfers it receives (when its output gap falls below that of "Foreign"), which reduces the negative impact of the procyclical national fiscal consolidation when debt becomes too high. "Foreign" finances these transfers through taxation, which reduces its welfare, but it can benefit through trade spillovers from "Home" and through the impact on the common monetary policy. These spillovers are higher when both countries are integrated through trade and when prices are more flexible. The net welfare gain or loss for "Foreign" also depends on the amount of transfers it pays relative to the output gap differential (the transfer elasticity of the central capacity).

Chart A

Variability union-wide inflation and the policy rate, with demand shocks (left panel) and productivity shocks (right panel)



A central fiscal capacity can also reduce the variability of union-wide inflation. By reducing the relative output gap differential and compensating for (some of) the procyclical tightening in "Home", the transfers from the central fiscal capacity can reduce the variability of inflation in the monetary union. This result is sensitive to the type of shock (see Chart A). For example, in the case of a negative demand shock the transfers from the central fiscal capacity weigh against the lower inflation in "Home", thereby reducing variability in the monetary union as a whole. In the case of a supply shock, where output and inflation move in opposition, the transfers strengthen the inflation effect in "Home" and increase the variability in the monetary union. When the transfer elasticity is high, the transfers switch from reducing to increasing the relative output gap, as "Foreign" finances the transfers. Lower variability in inflation translates into lower variability in the policy rate of the central monetary authority.

1.3.5 The balance sheet dimension and political economy aspects of central bank independence

In a monetary union, monetary policy measures can naturally produce wealth transfers between agents from different member countries. The magnitude of these transfers depends on the design of the facilities used by the central bank. Moreover, in view of the large number of fiscal authorities there are additional political economy aspects that are of particular relevance for monetary unions. As discussed in detail in Box 2, for certain monetary policy operations risk-sharing considerations can differ between incomplete monetary unions and complete monetary unions. Moreover, the independence of the central bank can be bolstered by balance sheet support from a strong capital position or guarantees provided by the fiscal authorities. Such built-in fiscal support helps to strengthen the ability of the central bank to act independently when necessary.

2 Monetary-fiscal policy interactions in EMU until end-2019

This chapter discusses the varied experience of monetary-fiscal policy interactions in EMU up until the eve of the pandemic. It starts with a short overview of the EMU framework when the euro was launched and the performance of monetary policy, before discussing the policies and trends that have affected monetary-fiscal policy interactions.

After the successful launch of EMU and a relatively smooth first decade, the great financial crisis and the subsequent sovereign debt crisis exposed weaknesses in both the design of the Maastricht framework and its implementation. Insufficiently countercyclical fiscal policies and a lack of structural convergence, together with failures in banking regulation, were among the factors that contributed to the uneven starting positions of Member States at the outset of the sovereign debt crisis. In some countries the need to restore fiscal sustainability and ensure market access led to particularly strong fiscal consolidation during and after the sovereign debt crisis. It also led to a rather unbalanced interaction between fiscal and monetary policies as macroeconomic stabilisation was left to monetary policy. All this in an environment with significant country divergences and a low and declining natural rate which implied that monetary policy was increasingly constrained by the lower bound on nominal interest rates.

There have been important changes and additions to the monetary toolbox and economic, fiscal and financial sector policies in response to these experiences. These changes ensured that the euro area was better prepared to respond swiftly to the pandemic shock. However, important reforms in the economic, fiscal and financial sector policy areas, both at country and at euro area level, were still unfinished or under discussion as part of a search for political consensus when the pandemic struck.

2.1 The architecture of EMU when the euro was launched

The architecture of EMU, laid down by the Maastricht Treaty, reflects the view that an independent central bank can control inflation over the medium term, provided it is not forced to finance fiscal deficits. The institutional set-up of EMU is unique in the sense that it matches a single monetary policy assigned at the supranational level with mostly national fiscal and economic policies. Fiscal, economic and structural policies remained competences of the Member States, as did the regulation and supervision of the financial sector. At its inception, this framework was based on an allocation of policy responsibilities, objectives and instruments, guiding principles for the conduct of economic policies, and an institutional set-up that reflected the pre-crisis consensus view (as described in Chapter 1).

With regard to monetary policy, the Treaty established the Eurosystem, with the ECB at its core and a clear mandate to maintain price stability. To ensure the mandate is operational, the Governing Council has provided a quantitative definition of price stability.[53] The Treaty's monetary financing prohibition was established to safeguard central bank independence and to direct monetary policy towards price stability in the euro area (see Box 5).

Fiscal sustainability remained a national responsibility – this is underscored by the Maastricht Treaty's "no bail-out" clause. The governance framework of EMU recognises that the lack of independent monetary policy at national level means there should be sufficient fiscal flexibility and adequate buffers to respond to business cycle fluctuations and other adverse shocks. To ensure that this necessary short-term flexibility would not endanger the long-term sustainability of public finances and that it would be consistent with the central bank's price stability objective (monetary dominance), Member States agreed on the EU fiscal framework laid down by the Treaty and the Stability and Growth Pact (SGP) which sought to prevent excessive deficit and debt ratios.[54]

The rules-based framework of EMU provides for implicit coordination between monetary and fiscal policies. The announcement of a quantitative definition of price stability was not only a device that allowed the assessment of the ECB's performance over time, it was also a way to implicitly coordinate the large number of policymakers in the euro area. Mechanisms supporting the explicit coordination of discretionary monetary and fiscal policymaking were not foreseen, as the optimal contribution of fiscal policy to macroeconomic stabilisation was thought to follow from allowing automatic stabilisers to operate freely and symmetrically over the cycle. In exceptional circumstances the use of discretionary fiscal policies could be considered, but these would need to stay within the provisions of the SGP[55] and their effectiveness would need to be carefully evaluated, given that it is difficult to identify in real time the nature of economic shocks and deliver a timely and appropriate fiscal response.[56]

Structural and (most) financial sector policies also remained a national responsibility. The role of European institutions was largely limited to peer reviews, benchmarking and other soft forms of coordination and surveillance. The assumption was that the opportunities presented by the single market and the monetary union, and the need for national economies to successfully function within the single market and currency union without the possibility of exchange rate devaluations, would encourage the implementation of necessary reforms leading, thereby, to economic

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53 Price stability was defined in 1998 as a range of positive values of inflation below 2%. In the 2003 strategy review it was clarified that monetary policy was not indifferent to inflation rates within this range but was aiming at rates below, but close, to 2% over the medium term.

54 The arguments in favour of constraining fiscal policies in EMU through the implementation of common rules were informed by the literature on avoiding the "free-rider" problem in fiscal policies as well as time inconsistency issues in monetary policies. This is described in Section 1.3.1.

55 According to the 1997 Resolution of the European Council on the Stability and Growth Pact (OJ C 236, 2.8.1997, p. 1), deficits of above 3% of GDP would be regarded as excessive unless they were expected to be temporary and occurred under exceptional circumstances. Circumstances qualified as temporary and exceptional if the deficit overshoot was driven either by an unusual event beyond the control of the Member State or by a severe recession (see European Central Bank, 1999).

56 See Buti and van Noord (2004).

and institutional convergence, while ensuring a high degree of national ownership and subsidiarity. This turned out to be an overly optimistic view.

Box 5
Lessons learnt from the prohibition of monetary financing

The prohibition of monetary financing is a cornerstone of the architecture of EMU, preserving the independence of the ECB and the NCBs in conducting monetary policy geared primarily towards maintaining price stability. According to Article 123 of the Treaty on the Functioning of the European Union (TFEU), the ECB and NCBs are not allowed to grant credit to the public sector, nor are they allowed to directly purchase public sector debt instruments. In the Treaty the prohibition is at the same level as central bank independence (Article 130 of the TFEU) and the price stability objective (Article 127 of the TFEU). By ensuring that governments are subject to financial market discipline, the prohibition forms part of the institutional framework promoting sound fiscal policies.[57]

Since the second stage of EMU began in 1994, the ECB has been entrusted with monitoring the compliance of all EU central banks with the monetary financing prohibition (Article 271(d) of the TFEU).[58] This monitoring takes into account (i) Council Regulation (EC) No 3603/93 with definitions, exemptions and additional clarifications in respect of the prohibition, (ii) internal rules and thresholds agreed by the ECB's Governing Council,[59] (iii) the general stance with regard to the compatibility of national legislation with the prohibition that was developed within the framework of consultations between the ECB and Member States on draft national legislation (ECB legal opinions)[60] and (iv) the case-law of the Court of Justice of the European Union (CJEU).

As a part of its monitoring role, the ECB conducts an annual monitoring exercise to assess compliance by all NCBs in the EU. The outcome of this exercise is published in the ECB's Annual Report. The global financial crisis introduced further risks to financial stability and fiscal sustainability and drew NCBs and the ECB into measures that could be perceived as giving rise to monetary financing concerns. The ECB's regular monitoring ensured that in the case of concern effective mitigation measures had been taken and there was no recurrence of any problematic situations.[61]

The monetary financing prohibition did not constrain the effectiveness and efficiency of monetary policy when interest rates were close to the effective lower bound (ELB). Although primary market purchases of public sector debt instruments are prohibited, central banks

57 The prohibition is complemented by the prohibition of privileged access (Article 124 of the TFEU) and the "no bail-out" clause (Article 125 of the TFEU), both supporting market discipline, as well as rules on the size of government debt and the deficit (excessive deficit procedure), which supplement the imperfect nature of the financial market's monitoring of public finances.

58 In parallel, the European Commission monitors Member States' compliance with the prohibition.

59 The Governing Council agreed on several issues, such as the holdings of public sector debt instruments in the central bank's non-monetary policy portfolio, as well as monitoring thresholds, which it regularly refines.

60 See Articles 127(4) and 282(5) of the TFEU and Section 2.2 of the ECB's 2020 Convergence Report.

61 The involvement of the Central Bank of Ireland in the liquidation of the Irish Bank Resolution Corporation in 2013 raises persisting serious monetary financing concerns. While the ongoing asset sales are a significant step in the right direction, only the full disposal of the assets will dispel such concerns. In its 2016 Annual Report the ECB had assessed the establishment and funding of MARK Zrt., an asset management company, by the Magyar Nemzeti Bank, as constituting a violation of the monetary financing prohibition that needed to be corrected. Following the completion of the necessary corrective actions by the Hungarian central bank, the case was formally closed in early 2019.

may, in principle, purchase government bonds in the secondary market. Secondary market purchases should not circumvent the objective of the prohibition – they should solely ensure fulfilment of the ECB's mandate and they should be fully consistent with central bank independence. The CJEU's ruling confirmed full compliance of the asset purchase programme (APP) with the monetary financing prohibition. The design of the APP to include a set of safeguards (e.g. limits and a blackout period) ensures that purchases of sovereign bonds in the secondary markets do not undermine the incentives for Member States to maintain sound budgetary policies.[62]

Against this background, the monetary financing prohibition remains an essential ingredient of the architecture of EMU. Notwithstanding the crises of the past two decades, long-term inflation expectations did not overshoot, indicating public trust in the ECB's ability to maintain price stability. The prohibition, together with other elements of the institutional set-up, has safeguarded central bank independence and monetary policy geared towards maintain price stability.

2.2 The ECB's monetary policy: a short overview

In the first decade of EMU, monetary policy was able to attain price stability and stabilise output, although this became more challenging in the aftermath of the financial and sovereign debt crises. During the first decade of EMU, actual inflation and inflation expectations were hovering at around 2% most of the time, but both fell in the aftermath of the euro area sovereign debt crisis (see Chart 1, panel a).[63]

Over time, the monetary policy toolbox has been augmented to include unconventional measures as the ability of monetary policy to steer inflation through policy interest rates has become increasingly constrained. In response to the global market meltdown and the banking crisis that followed the collapse of Lehman Brothers in 2008, the ECB engaged in large-scale liquidity operations (including full allotment) to provide a backstop to dysfunctional interbank markets. During the sovereign debt crisis, the ECB engaged in monetary policy operations that complemented, rather than replaced, interest rate decisions. Operations included sovereign debt purchases under the ECB's Securities Markets Programme, which started in May 2010, and longer-term liquidity provision to banks in 2011-12.[64] In the summer of 2012 the ECB announced it could engage in Outright Monetary Transactions (OMTs) to safeguard the integrity of the euro area and the transmission of its monetary policy.[65] Starting with forward guidance in 2013, an array of non-standard monetary tools were adopted that were primarily aimed at moving inflation

62 See Court of Justice of the European Union (2018), Judgment of 11 December 2018 in Case C-493/17, *Heinrich Weiss and Others*, ECLI:EU:C:2018:1000.

63 See Work stream on the price stability objective (2021).

64 See Hartmann and Smets (2018).

65 For a discussion and assessment of the Securities Markets Programme and OMTs, see Rostagno et al. (2019) and Hartmann and Smets (2018).

higher, given that conventional monetary policy had reached the ELB.[66] APPs increased the size of the ECB's balance sheet[67] and contributed to a reduction in the euro overnight index average (EONIA), while the output gap closed, becoming positive in 2017 (see Chart 1, panel b). In general, a key driver of the adoption of non-standard measures has been the steady decline in the natural rate of interest.

Approaching the lower bound made it increasingly complicated for monetary policy to raise inflation back to the objective. There is no unique or standard way to assess the cyclicality of monetary or fiscal policy, which involves determining the monetary or fiscal stance in relation to the level of/change in capacity utilisation in the economy.[68] Measured by years in which changes in the short-term interest rate were coincident with the *change* in the output gap, with countries weighted by their share of the euro area economy, monetary policy was mostly strongly countercyclical before and during the financial and sovereign debt crises, except in some turning-point years (see Chart 1, panel c). However, from 2014 onwards, monetary policy remained accommodative in the face of a persistent gap between inflation and the price stability objective while the output gap, as estimated by the European Commission, gradually closed, becoming positive in 2017.

The interaction between fiscal and monetary policies also became more uneven. All major central banks resorted to unconventional monetary policies to meet the significant challenges brought on by the global financial crisis.[69] One challenge that was specific to the euro area was the interaction between the single monetary policy and the heterogenous economic and fiscal positions of Member States. This challenge was insufficiently addressed during the first decade of EMU and was exposed and, in part, exacerbated by the two crises. After the financial crisis, both monetary and fiscal policies were strongly accommodative at the aggregate level in the period 2009-10. However, during the 2011-12 recession, monetary policy offered a stimulus that was modest by historical comparison, while fiscal policy switched to discretionary consolidation to address debt overhang and debt sustainability concerns in the aftermath of the sovereign debt crisis (see Chart 1, panel d). In that period the estimated contribution of discretionary fiscal policies to euro area core inflation, which had been around 0.3-0.4 percentage points during most of the period of EMU, fell to around zero in the period 2014-15 (see Box 6).

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66 For an overview and assessment of the effectiveness of these measures, i.e. the negative interest rate policy, asset purchases (under the APP), forward guidance on the expected future evolution of the ECB's policy rates (FG), and targeted longer-term refinancing operations (TLTROs), see Work stream on monetary policy communications (2021).

67 The overwhelming majority of these assets consist of sovereign debt securities. These are subject to minimum credit quality requirements which are waivable under certain conditions.

68 Since capacity utilisation is an unobservable variable, measures of economic slack necessarily need to rely on estimates (which often evolve over time) and/or partial observable indicators. For a wider discussion of cyclicality and monetary-fiscal policy interactions, see Bartsch et al. (2021). For an alternative measure of the monetary and fiscal stance see Batini et al. (2020).

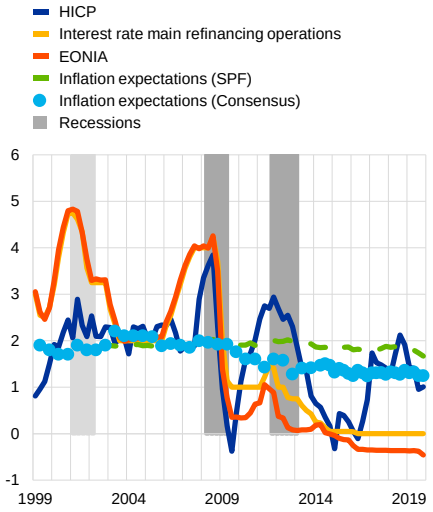
69 See Altavilla et al. (2021).

Chart 1

Monetary policy in EMU and the policy mix

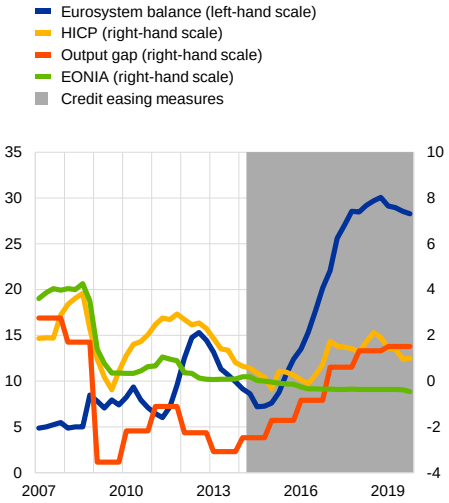
a) Inflation (expectations) and interest rates

(percentages)



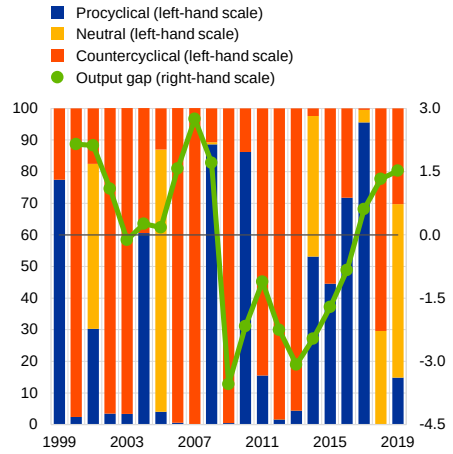
b) ECB balance sheet, HICP and output gap

(left-hand scale: percentage of potential GDP; right-hand scale: percentage of GDP)



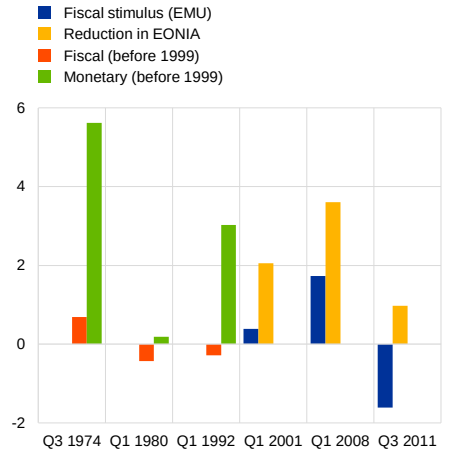
c) Cyclicality of interest rate to changes in the output gap

(left-hand scale: annual change in output gap coinciding with the change in the short-term interest rate in euro area countries, weighted by these countries' share of euro area GDP, percentage of potential GDP; right-hand scale: output gap, percentage points)



d) Policy mix in euro area recessions

(reduction in overnight interest rate in percentage points; average reduction in underlying budget balance as a percentage of GDP; y-axis: two years after the start of recession; x-axis: start of euro area recession*)



Sources: AMECO, Deutsche Bundesbank, CEPR, ECB, IMF, OECD and own calculations.
Notes: Chart 1, panel a: SPF is the Survey of Professional Forecasters issued by the Federal Reserve System. Chart 1, panel c: monetary policy is classified as countercyclical in a euro area country if the annual change in short-term interest rates and the change in the output gap estimated by the European Commission have the same sign, procyclical if they have the opposite sign and neutral if the absolute change in both is below the lowest decile in the sample. Chart 1, panel d: monetary stimulus is identified as the maximum reduction of the Frankfurt overnight rate (before 1999) or the EONIA (after 1999) in the two years after the onset of the downturn. Fiscal stimulus is identified as the average annual reduction of the primary cyclically adjusted budget balance in the two years after the onset of the downturn, in (W)-DE, ES, FR, IT and NL as estimated in the OECD November 1999 Economic Outlook (before 1999) and in the euro area as estimated by the European Commission (after 1999).
*Euro area recessions identified by the CEPR Recession Dating Committee: five recessions and a "prolonged pause in the growth of economic activity" starting in Q1 2001.

Box 6

Fiscal policy and inflation in the euro area: a VAR-based analysis

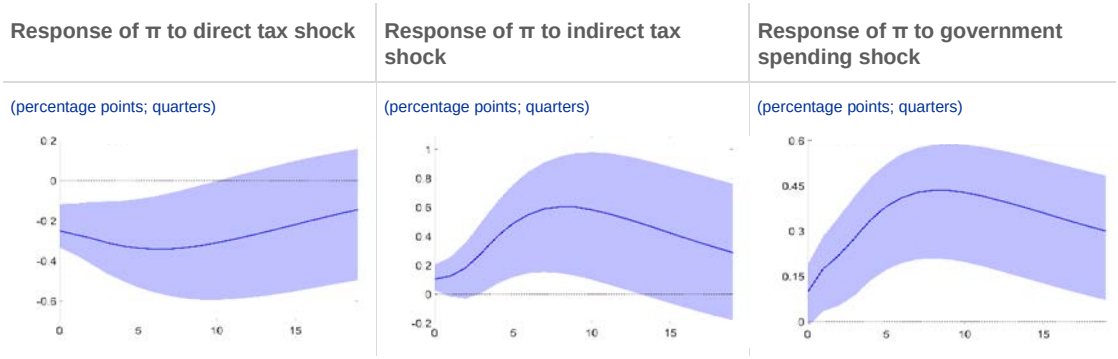
This box presents estimates of the contribution of fiscal policy to aggregate euro area core inflation since 1999.[70] We focus on the effects on inflation of shocks to government spending, direct tax and indirect tax.

Fiscal policy may affect inflation in several ways, depending also on the monetary policy stance. First, as suggested by standard New Keynesian models, government spending typically boosts output in the short to medium run, which in turn increases inflation via aggregate demand.[71] Second, direct tax hikes depress disposable income, which typically translates into lower consumption and prices. Third, indirect tax hikes (e.g. VAT) have an immediate effect on the price level as long as they are directly transmitted to final consumer prices. While these effects are likely to be enhanced over time by price stickiness, they may also be partially offset by the contractionary impact of the shock via aggregate demand. In general, the effects of fiscal policy on prices will also be alleviated by the endogenous monetary policy response. At the ELB of interest rates, however, less dampening is expected to occur.[72]

The empirical analysis is based on a quarterly Bayesian Vector Autoregressive (BVAR) model, estimated on aggregate euro area data for the period from Q1 1980 to Q3 2019. The proposed BVAR model includes the following six variables: (1) government spending (G), defined as government consumption plus investment, (2) direct taxes (DTX), (3) indirect taxes (TIN), (4) GDP, (5) the annual HICP excluding energy inflation, and (6) the nominal short-term shadow interest rate.[73]

Chart A

Effects of fiscal policy shocks (1% of GDP) on core inflation



Source: Own calculations based on aggregate euro area data from Q1 1980 to Q3 2019.
Notes: The chart shows the percentage point reaction of aggregate euro area core inflation (π) to a 1% of GDP shock to direct taxes (panel a), indirect taxes (panel b) and government spending (panel c). Confidence bands are at the 68% level.

The three fiscal shocks have distinct effects on inflation. Chart A shows the effect of a shock of 1% of GDP, for the three fiscal variables. The direct tax shock triggers an inflation contraction of about 0.3 percentage points, which remains statistically significant for about eight quarters after the

70 This box draws from ongoing work carried out with Frederic Opitz from Ghent University.

71 See, for example, Galí et al. (2007).

72 The interaction between fiscal and monetary policy, especially at the ELB, has been analysed in a number of papers. See, for example, Bassetto and Sargent (2020).

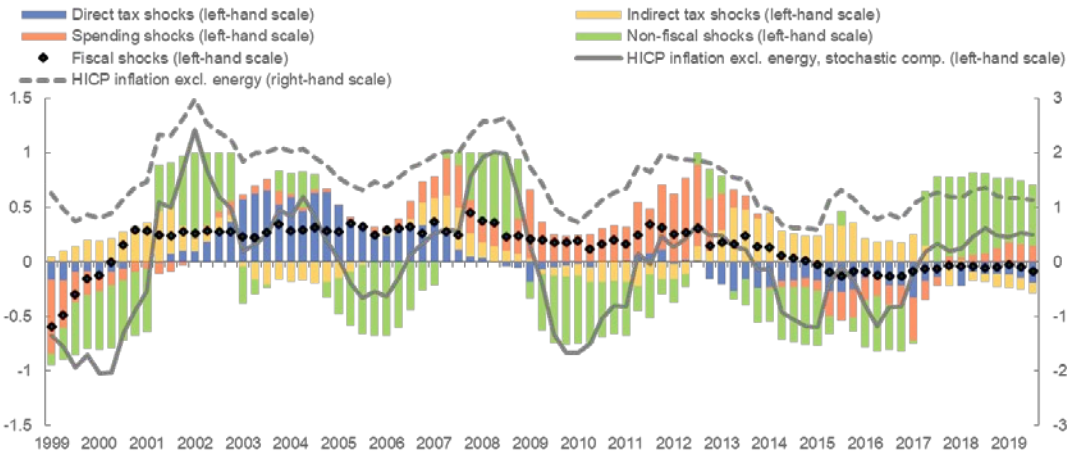
73 In the model the three fiscal shocks (direct and indirect taxes, government spending) are identified by a combination of short-term and sign restrictions.

shock. Indirect tax shocks generate a positive and increasing inflation response. The delayed reaction of inflation could be explained by a gradual pass-through of the tax rate hike to final consumer prices. In the medium term, once all firms have adjusted their prices the inflation response reverts to zero. Finally, inflation also reacts positively to a government spending shock and begins reverting slowly towards zero after about eight quarters.

Chart B

Historical shock decomposition of euro area core inflation

(percentage points)



Source: Own calculations based on aggregate euro area data from Q1 1980 to Q3 2019 (only the EMU period is shown).
Notes: The chart shows the aggregate euro area core inflation (dashed grey line, right-hand scale) and its stochastic component, i.e. the component of inflation which can be explained by shocks in the SVAR model presented in this box (solid grey line, left-hand scale). This component is broken down into contributions from direct taxes (blue bars), indirect taxes (yellow bars), government spending (orange bars) and non-fiscal (unidentified) shocks (green bars). The overall contribution of fiscal shocks is represented by black diamonds.

Our analysis suggests that fiscal policy shocks have contributed in a small but non-negligible way to inflation developments during the period of EMU. Chart B indicates that the start of EMU (1999-2001) was characterised by a negative (albeit shrinking) contribution from government spending shocks, possibly as a lagged effect of the consolidation policies in place at the end of the1990s. The effect of direct tax shocks was positive and sizeable in the period 2003-05 while indirect taxes made a marginally positive contribution in the period 2007-08. The latter effect was probably driven by the VAT hike in Germany in 2007. The role played by fiscal shocks in explaining inflation developments increased during the global financial crisis of 2008-09 (a net contribution of about 0.4 percentage points). During the global financial crisis EU governments enacted the European Economic Recovery Plan (EERP), which entailed a significant fiscal stimulus on both the revenue and the spending sides. It should be noted that the contributions in Chart B depend on the contemporaneous response of inflation to the fiscal shocks, and also on their lagged effects, as reflected in the impulse responses shown in Chart A. For example, the effect of the EERP stimulus via government spending reached its peak in 2011 (i.e. around two years after the launch of the EERP).

The relative contribution of government spending and indirect taxes reversed amid the fiscal consolidation of 2011-12. In this period fiscal stimulus via government spending was progressively withdrawn (with a reduced inflationary effect) which was in part counteracted by the direct impact of VAT hikes in multiple euro area countries (such as Italy and Spain), reflected in the progressively more positive contribution of this component to inflation until around 2015. In the second half of the

2010s, when the euro area fiscal stance became broadly neutral, fiscal shocks played a minor role in explaining inflation developments.

2.3 Asymmetries in the euro area and the role of structural policies

Both real and nominal convergence across euro area countries have been uneven since the start of EMU.[74] In the first years of EMU economic vulnerabilities and weaknesses in economic and institutional structures were masked by the temporary effect of credit booms, mostly coupled with strong housing price increases.[75] The global financial crisis and, to an even greater extent, the European sovereign debt crisis highlighted, however, a high level of economic and institutional heterogeneity among Member States. During the last decade the income per capita gap relative to the most productive Member States has increased further in some countries, although there was some convergence during the six years prior to the COVID-19 crisis and central and eastern European euro area countries generally caught up steadily over time.

The experience of the past 20 years suggests there is a strong need for structural policies to reduce cross-country divergences, strengthen economic resilience and ensure EMU functions smoothly. Structural policies encompass a broad set of policies aimed at improving market-based resource allocation and enhancing innovation and productivity, thereby ensuring economies are more dynamic and more resilient to shocks.[76] Well-designed reforms can permanently alter the supply side of an economy and can create an environment in which innovation can thrive. Such policies lift potential output, either by strengthening incentives to increase production inputs – the supply and quality of labour and the amount of capital per worker – or by ensuring that such inputs are used more efficiently, thereby raising productivity growth, income prospects and, as a result, aggregate demand. Higher trend labour productivity growth makes it possible to raise real wages without endangering employment. High quality institutions, as reflected in particular in the efficient functioning of public administration and the rule of law, are prerequisites if reforms in other areas are to be effectively implemented and yield their full potential. Some structural reforms come with short-term negative effects on aggregate demand and inflation (see Section 1.3.2), although the credible

74 See Capella-Ramos et al. (2020) and Diaz del Hoyo et al. (2017) for in-depth analyses of convergence in euro area countries.

75 Contrary to expectations, euro area entry was often followed by delayed, rather than earlier, implementation of key economic reforms in the Member States with large macroeconomic imbalances and led to inefficient capital allocation (Fernandez-Villaverde et al., 2013; Challe et al., 2019; Gopinath, et al., 2017; Reis, 2013). Influenced by financial factors, differences in medium-term fluctuations of the business cycle have, over time, become greater and more asymmetric among euro area countries (Hessel, 2020).

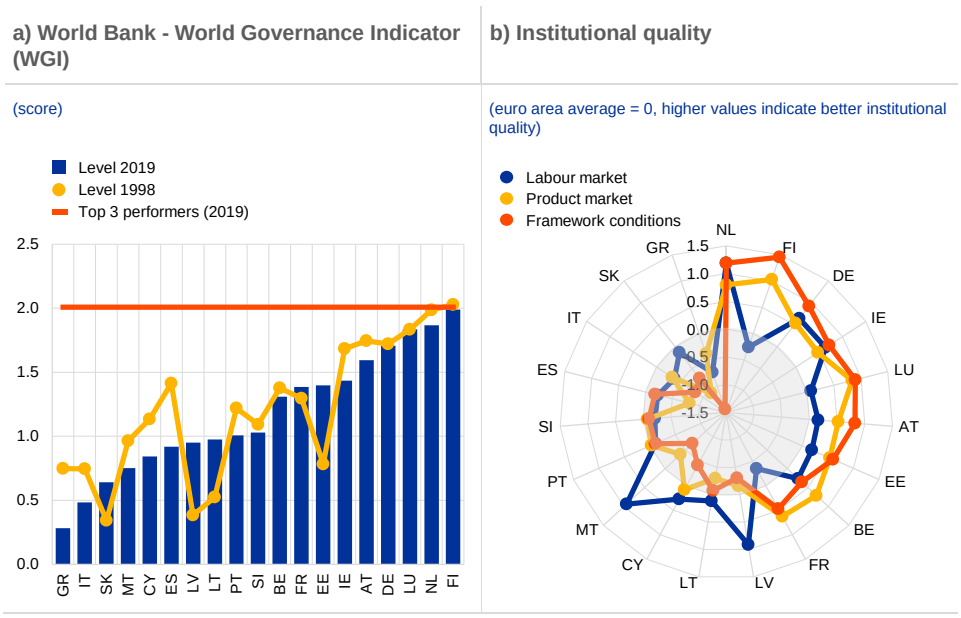
76 Many structural policies (e.g. policies aimed at tackling rent-seeking behaviour in product markets or addressing tax evasion and improving the quality of public services and transfers) also improve the inclusiveness of growth by specifically benefiting groups at the lower end of the income or wealth scale (for an overview see Masuch et al. (eds.), 2018).

implementation of reforms could, in principle, bring forward future reform-driven income gains and mitigate potential short-term costs.

Appropriate structural policies can also support the effectiveness of monetary policy and bring the euro area closer to an optimal currency area. First, flexible economic structures can improve the transmission of monetary policy if changes in financial conditions affect spending – and thus inflation – more effectively. Second, structural policies can also support potential output growth, thereby raising the real equilibrium interest rate and reducing the likelihood of future lower-bound episodes. Third, structural policies can bring the euro area closer to an optimal currency area, e.g. by facilitating the synchronisation of business cycles and helping to smooth the adjustment to asymmetric shocks across regions and countries. Fourth, structural policies in the financial sector can reduce market fragmentation and strengthen the contribution of finance to a more efficient allocation of savings and higher capital buffers. For example, fiscal-structural policies aimed at reducing the tax bias against equity financing can support the efficiency of financial markets and risk sharing across euro area countries. Finally, policies that enhance trend potential growth increase fiscal space (at unchanged tax rates), allowing fiscal policy to better support monetary policy at the lower bound.

Chart 2

Economic structures and reform



Sources: World Bank WGI Project; OECD, World Bank, Heritage Foundation and World Economic Forum.
Notes: Chart 2, panel a: Countries are ordered by the average value of governance in 2019 for four categories. These are governance effectiveness, regulatory quality, rule of law and control of corruption. The governance performance estimate ranges from approximately -2.5 (weak) to 2.5 (strong). The top three global performers are, in order of ranking, Singapore, Finland and Norway. Chart 2, panel b: Each of the three dimensions (labour market, product market and framework conditions) is based on a composite indicator defined as an unweighted average of a set of indicators compiled by international organisations. Before averaging, all indicators are transformed into z-scores. The composite labour market indicator contains the OECD employment protection legislation index, the Heritage labour market efficiency index, the Fraser labour market regulation index and the World Economic Forum labour market flexibility index. The composite product market indicator contains the OECD Product Market Regulation index, the Fraser Business Regulation index, the World Economic Forum Domestic Competition index and the Heritage Business Freedom index. The composite framework conditions indicator contains four World Bank governance indicators (regulatory quality, government effectiveness, absence of corruption and rule of law), the World Bank Doing Business index, the World Economic Forum Public Institutions index and the Heritage Corruption Freedom and Property Rights index. For all indicators the latest data are used which, for most indicators, are for 2020.

The momentum of structural reform in euro area countries has been insufficient and uneven, despite the need for wide-ranging reform.[77] Over the last two decades, institutional and market reform in euro area countries has, overall, been insufficient to deal with the economic and demographic challenges presented.[78] While the nature and the severity of economic vulnerabilities varies considerably across the euro area, all euro area countries face – to a varying extent – some of the following challenges: a persistent decline in productivity growth in recent decades, considerable private and public debt, high levels of (youth) unemployment, an ageing population, and the transition to a climate-neutral economy. Importantly for the functioning of the monetary union, not only do most euro area countries have substantial scope for improvement in a global comparison (see Chart 2, panel a), but there is also heterogeneity across countries, with a subset of countries having structures which are below the euro area average in respect of product and labour markets as well as institutional frameworks (see Chart 2, panel b).

2.4 The sovereign-bank nexus and the sovereign debt crisis in the euro area

2.4.1 Cyclicality of fiscal policies before the global financial crisis

With the start of EMU, fiscal policies became the main policy tool through which euro area countries could respond to idiosyncratic shocks and business cycle fluctuations. Other policy instruments could no longer be used to address country-specific shocks (monetary policy), could not be counted on (cross-border public risk sharing), were underdeveloped (private risk sharing) or were underused (ensuring flexibility though structural policies).

From today's perspective, fiscal policies were insufficiently countercyclical in the decade before the financial crisis. Measured in relation to the change in the output gap (similar to the assessment of the cyclicality of monetary policies in Section 2.2)[79], fiscal policies were procyclical in countries representing at least a third of the euro area economy in almost all years (see Chart 3, panel a). In "good times", such as the first years of EMU, when the convergence of interest rates

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77 This is reflected, among other things, in the low level of compliance with the European Council's country-specific recommendations. In respect of labour markets, more could be done to ease the adjustment of relative wages across Member States and to ensure fairer and better opportunities for education and life-long learning. In product markets more efficient regulations, leading to less complex licensing procedures or lower administrative and market entry costs, would promote the creation of firms, facilitating the restructuring or exit of unproductive firms and removing the obstacles that prevent firms from reaching their optimal size. Significant gains could also be achieved by making further progress in the establishment of a fully-fledged EU internal market for services, given that a large share of the potential gains which would derive from the full implementation of the EU Services Directive remains unrealised.

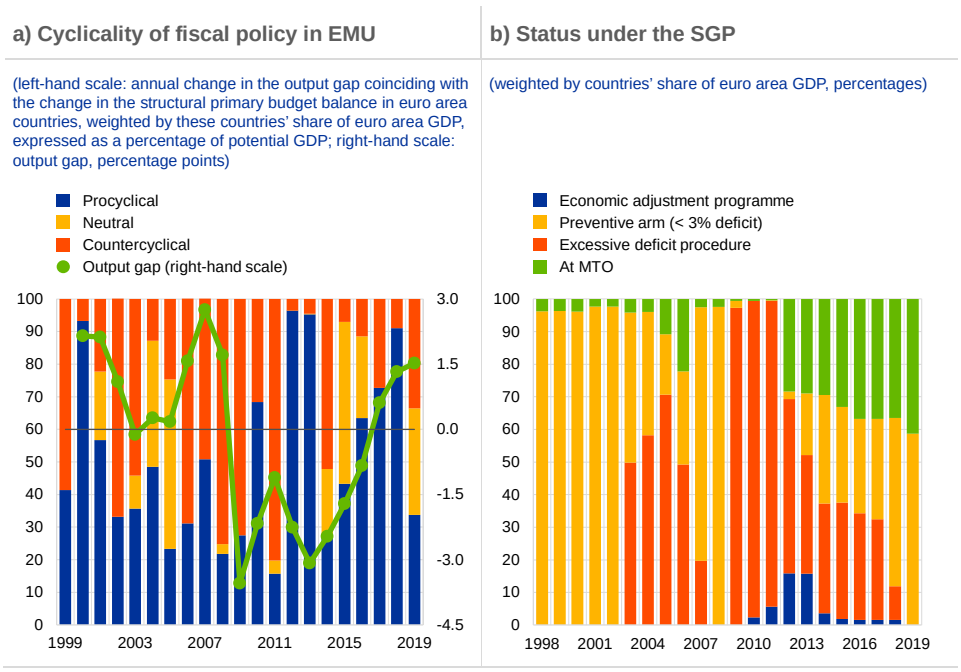
78 In the period 2011-13 countries following a financial assistance programme introduced a number of important labour and product market reforms aimed at supporting employment and productivity. However, after that reform momentum slowed down again.

79 The procyclicality and countercyclicality of the fiscal stance could, alternatively, be measured in relation to the level of the output gap.

supported growth, the share of procyclical fiscal policies was even higher. This asymmetry in the fiscal stabilisation of the business cycle also showed up in the (lack of) compliance with the common fiscal rules, which is shown by a rise in the (GDP-weighted) share of euro area countries subject to an excessive deficit procedure and by the very low share of countries with a balanced budget in structural terms or which meet their medium-term budgetary objective before 2008 (see Chart 3, panel b). An important premise in the architecture of EMU was that a budget balance "close to balance or in surplus" in good times would create sufficient fiscal space to enable the automatic stabilisers to operate in downturns (see Box 7 for estimates of the stabilisers in the euro area).

Chart 3

Cyclicality of fiscal policies



Sources: AMECO, European Fiscal Board, own calculations.
Notes: Chart 3, panel a: Fiscal policy is classified as countercyclical in a euro area country if the annual change in the structural primary budget balance (the primary cyclically adjusted budget balance before 2009) and the change in the (ex post) output gap estimated by the European Commission have the same sign, procyclical if they have the opposite sign, and neutral if the change in both is below the lowest decile in the sample. Chart 3, panel b: Status under the SGP is based on a European Fiscal Board dataset (Larch and Santacroce, 2020), with a country's position in respect of its medium-term budgetary objective assessed, in a backward-looking exercise, against the country-specific medium-term budgetary objectives since 2006 and a balanced budget in structural terms between 1998 and 2005. Until 2003, the structural improvement is measured by the change in the cyclically adjusted balance.

Over time, insufficient and uneven consolidation in good times have reduced the fiscal space available in the euro area countries to respond to shocks, and the ability of all sovereigns to contribute equally to macroeconomic stabilisation. As insufficient buffers were built up in good times, the 3% reference value in the SGP implied there would be some restrictions on budget deficits in bad times.[80] In many cases this required discretionary fiscal consolidation in the context of excessive deficit procedures, which meant that the effect of automatic stabilisers

[80] The SGP foresees the possibility of opening excessive deficit procedures on the basis of debt criterion alone, but this was not operationalised until the 2011 SGP reform. After 2011, wide de facto differentiation in the required speed of debt reduction was implemented in EU fiscal surveillance through new interpretations and by extending elements of discretion and judgement (see European Fiscal Board, 2020).

was countered. Application of the fiscal rules was also uneven, as their enforcement ultimately relied on peer pressure among sovereign Member States, which in the end were never willing to sanction each other.[81] The level of heterogeneity in the fiscal positions of euro area countries remained high and was, in some cases, exacerbated by (in part initially underestimated) economic and structural vulnerabilities. When the European Commission asked Member States at the end of 2008 for a coordinated short-term budgetary impulse as part of the EERP to counter the impact of the global financial crisis, discretionary stimulus packages in 2009 varied between 2.3% and 0% of GDP.[82]

Box 7

Automatic fiscal stabilisers in the euro area: size, evolution and effectiveness

This box discusses automatic fiscal stabilisers, which refer to elements in government revenues and expenditures that smooth the economic cycle without any need for discretionary government action.[83] Given that they tend to be timely, targeted and temporary in reducing fluctuations in economic activity, automatic fiscal stabilisers do not experience some of the drawbacks of discretionary fiscal measures, such as implementation lags.

The ability to address country-specific shocks is especially important in a currency union with a single monetary policy instrument and multiple fiscal authorities. The relatively large share of taxes in GDP, progressive tax structures, various forms of benefits and, more generally, the size of governments means that automatic stabilisation plays an important role in the economic cycle of the euro area. However, differences in the size of automatic stabilisers across the euro area, as determined by the country-specific fiscal-structural architecture, imply that there is country heterogeneity in shock absorption. As a result, the monetary and fiscal policy mix may play out differently in different euro area countries when it comes to smoothing symmetric, euro area-wide shocks. At the same time, automatic stabilisers may not be sufficient to smooth large, asymmetric shocks in euro area countries. To give an example, in the current pandemic crisis discretionary fiscal policy measures were adopted by European governments to address the economic fallout.

Size and evolution

There are different approaches to quantifying automatic fiscal stabilisers, with significant uncertainty surrounding their actual size. First, automatic stabilisers may be defined and estimated in various ways. They are often measured as the overall response of the budget balance to changes in economic activity (the macroeconomic perspective). Alternatively, they can be estimated as the extent to which a shock to household market income translates into a change in disposable income (the microeconomic perspective). Second, relationships between fiscal and macroeconomic variables may change. Such changes may be temporary (e.g. as a result of an economic shock), or

81 The difficulty inherent in assessing the cyclicality of fiscal policy proved to be an additional complication. In some countries underlying fiscal positions were less sound than the headline figures implied (e.g. during housing booms). Over time, cyclically-adjusted budget balances were given a greater role in European fiscal surveillance, although this came with the difficulties inherent in assessing the state of the business cycle.

82 The largest stimulus was undertaken in Spain (2.3% of GDP), while no discretionary stimulus was undertaken in Greece or Italy (see van Riet (ed.), 2010).

83 This box draws on an ECB Economic Bulletin article (see European Central Bank, 2020a), as well as the ECB Economic Bulletin article “The role of automatic fiscal stabilisers in the COVID-19 crisis”, Issue 6/2020.

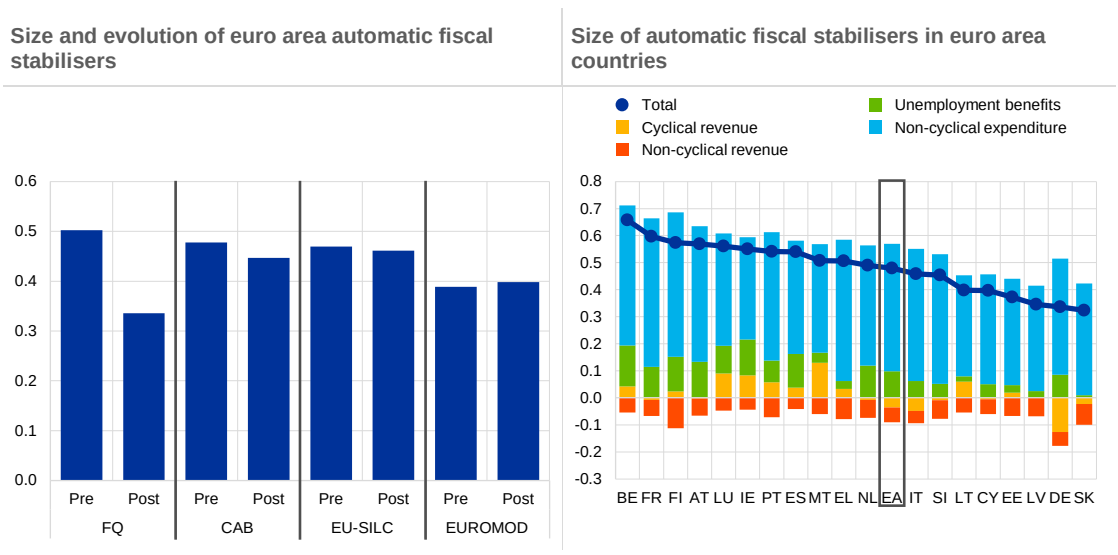
permanent, as the structure of the economy, along with tax bases and benefit entitlements, evolves. Third, estimates of automatic fiscal stabilisers may change if tax and benefit systems are reformed.

Automatic fiscal stabilisers for the euro area aggregate are estimated to be large (Chart A), ranging mostly from 0.4 to 0.5. This implies that a one-euro drop in aggregate output/income results in lower government revenues/taxes or higher expenditures/transfers of between 40 and 50 cents. These estimates are based on four different methods, which are applied to the period before and the period after the financial crisis. In general, macroeconomic approaches (ESCB Fiscal Questionnaire (FQ) and cyclically adjusted budget balance (CAB)) tend to produce somewhat larger estimates than microeconomic approaches (EU-SILC and EUROMOD). Each of the four methods considered here has distinct advantages and drawbacks. Importantly, the former two measures capture cyclical changes for a broader set of revenue and expenditure categories than the latter two measures, which only capture those government revenues and expenditures that affect household income.

At the same time, the size of automatic fiscal stabilisers varies quite significantly across euro area countries (Chart B). The larger size of automatic fiscal stabilisers in western and, to some extent, southern European countries is a consequence of three main factors: (i) larger government, (ii) more generous social security systems, and (iii) more progressive direct taxes.

Chart A

Size and evolution of euro area automatic fiscal stabilisers (panel a) and size of automatic fiscal stabilisers in euro area countries (panel b)



Notes: panel a: FQ approach uses headline fiscal data, controlling for discretionary fiscal measures as recorded in the ESCB Fiscal Questionnaire (FQ). The cyclically adjusted budget balance (CAB) approach employs the cyclical component of the budget balance as measured by the ESCB cyclical adjustment method; pre-crisis estimates for the period 2000-07 and post-crisis estimates for the period 2008-2022. EU-SILC approach uses household-level data on taxes paid and benefits received from the EU Statistics on Income and Living Conditions; pre-crisis estimates are averages for earliest available data to 2007, post-crisis estimates are averages for 2008 to 2016. EUROMOD uses the tax-benefit microsimulation model for the European Union; EUROMOD pre-crisis estimates are 2007 and post-crisis estimates are 2016. Panel b: The size of automatic stabilisers is estimated as a semi-elasticity multiplied by a standardised output gap of 1% of potential GDP. Due to the fact that the ESCB method incorporates the lagged response of a budget to macroeconomic shocks and the lagged effect of tax collections, the automatic stabilisers presented are expressed in cumulative terms over three years (T – T+2). The euro area average is indicatively calculated as a weighted average of individual semi-elasticities for all euro area countries, using nominal GDP in 2019.

A comparison of estimates for the euro area aggregate before and after the financial crisis suggests that automatic fiscal stabilisers remain relatively stable over time. Three of the four estimates show similar sizes for the euro area aggregate automatic fiscal stabilisers after the financial crisis as well as little change over time.

Effectiveness

Model simulations for the euro area suggest that automatic fiscal stabilisers are effective – they cushion between 10% and 35% of a standard GDP shock. In other words, the euro area economy contracts up to one-third less in response to a standardised shock than it does in a scenario with no automatic stabilisers. The bounds of this range of estimates are determined first and foremost by which automatic fiscal stabilisation elements are included in the definition. The bounds depend, in particular, on whether automatic fiscal stabilisers are only believed to include the cyclically-sensitive budgetary items (taxes and unemployment benefits) or whether they also capture the implicit stabilisation stemming from the inertia inherent in most non-cyclical spending items.

At country level, mainly because of differences in the size of automatic stabilisers, the amount of stabilisation is greater in western European countries such as Belgium or France, while it is noticeably less in central and eastern European countries such as Slovakia or Latvia. While a large government sector with progressive tax structures is typically thought to weaken economic prospects, countries with a smaller government sector may need to rely more on discretionary fiscal interventions to smooth shocks. Quasi-automatic fiscal instruments, such as short-time work schemes, can provide additional timely, targeted and temporary macroeconomic stabilisation.

2.4.2 The sovereign-bank nexus

A sovereign-bank nexus is a prevalent feature of modern economies.[84] With sufficient bank capital buffers, purchases of sovereign debt by banks can possibly stabilise financial markets, as banks may compensate for the loss of demand for sovereign bonds from other risk-sensitive investor groups.[85] However, in the case of insufficient bank capital buffers and increases in sovereign spreads, excessive sovereign bond purchases can weaken the nexus, leading to the risk of an adverse feedback loop (see Section 1.2.3). This can happen in particular via exposure to tail events and a deterioration of overall macroeconomic conditions, reflecting the increase in joint vulnerabilities linking banks and sovereigns (see Box 8), which might ultimately link sovereigns to the respective NCBs which are providing liquidity against government (guaranteed) collateral.

The financial and economic crisis of 2008-09 exposed the relationship between banks and their sovereigns. In some countries falling output and discretionary stimulus introduced to support the economy resulted in fiscal distress and an associated widening of sovereign spreads during the sovereign debt crisis, which in turn affected bank balance sheets. In other countries sovereigns shouldered (or were expected to shoulder) large burdens in order to recapitalise or resolve their national financial sectors, given the combination of large losses in a context of low capital buffers, a lack of cross-border risk sharing, the absence of clear resolution mechanisms, and financial stability concerns.

84 See, for example, Dell'Ariccia et al. (2018); Broner et al. (2014).

85 However, if banks effectively act as contrarian investors this implies that these banks have a different risk assessment from other market participants or that they are motivated by other factors, such as the treatment of sovereign exposures in banking regulation.

The sovereign-bank nexus in Europe was exacerbated by several factors. First, home bias in the holdings of sovereign debt by banks was supported by the regulatory treatment of sovereign holdings, among other things, and related to differential portfolio preferences.[86] Second, the geographical concentration of loan exposures added to the concentration of the sovereign-bank nexus within single EU countries, as banks are particularly vulnerable to domestic downturns.[87] Third, weak bank capital buffers increased expectations with regard to the bailing-out of banks by fiscal policy. Finally, the fall in output and the bailing-out of banks raised sovereign solvency concerns and, in some countries, led to a loss of market access.

Box 8

The sovereign-bank-corporate nexus

Interdependencies between sovereigns, banks and corporates can heighten the vulnerabilities affecting the economy and financial stability.[88] Such interdependencies have become far more prominent during the COVID-19 pandemic. Direct fiscal support in the form of bank-brokered guarantees provided to struggling firms, while offering crucial economic support, has also involved a potentially intensified source of risk propagation. The traditional link between banks and their borrowers implies that a weakening of corporates' ability to service their debts would lead to an increase in the share of non-performing loans on bank balance sheets which, in turn, could induce banks to reduce their credit supply and tighten lending conditions (see Figure A). In the face of stepped up fiscal links to corporates through widespread guarantees, a similar mechanism may hold, whereby a pick-up in corporate insolvencies challenges public finances through lower tax revenues and calls on government guarantees on bank loans, potentially triggering a repricing of sovereign risk and reducing the budgetary space available for further fiscal support. In addition to these macro-financial feedback effects between corporates and banks as well as between firms and sovereigns, there remains a lingering nexus between the banking sector and the domestic sovereign in some euro area countries via banks' higher domestic sovereign debt holdings.[89]

The sovereign-bank-corporate nexus seems particularly pronounced in some euro area countries, giving rise to concerns over fragmentation and divergence. The extent to which these sectoral interdependencies may translate into future challenges varies across the euro area. Banks in countries with higher debt levels also tend to exhibit higher domestic sovereign exposures and higher corporate NPL ratios. The increased co-dependence of sovereigns, corporates and banks therefore not only gives rise to adverse macro-financial feedback loops but also increases the risk of rising fragmentation and divergence across euro area countries. To a large extent, this fragmentation reflects unresolved legacy issues. Therefore, structural policies, in the labour and product markets and/or in the financial and fiscal domains, may help alleviate the sovereign-bank-

86 In a reversal of the generally decreasing trend of domestic sovereign debt held by banks in euro area countries before the crisis, banks increased their exposures to their own sovereign during the crisis, in particular in countries under pressure. For details see the Report of the EFC-High Level Working Group on the Regulatory Treatment of Sovereign Exposures, May 2016.

87 Based on a sample of 326 domestic and cross-border banks operating in the euro area, Albertazzi et al. (2021) show that the presence of foreign intermediaries helps to stabilise lending to the real economy, thus mitigating the sovereign nexus.

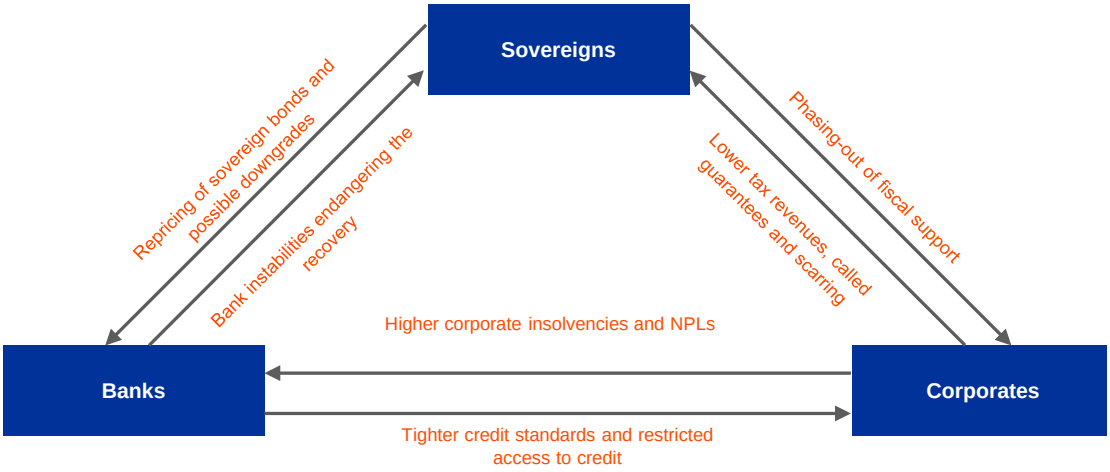
88 For more details and references, see Schnabel (2021).

89 The drivers of the sovereign-bank nexus have been analysed extensively in the past and also relate, for example, to the privileged regulatory treatment of sovereign bonds as risk-free assets. It should also be noted that banks and sovereigns are naturally exposed to a common source of macroeconomic shocks. The expansion of central bank credit and the associated demand for sovereign bonds as collateral can further increase banks' holdings of domestic sovereign debt as a share of total assets.

corporate nexus both directly, by reducing underlying vulnerabilities, and indirectly, via enhanced economic growth potential.[90]

Figure A

A potential vicious circle between sovereigns, banks and corporates



Source: ECB.

Macro-financial amplification through the sovereign-bank-corporate nexus may also represent a challenge for monetary policy. The more numerous interlinkages between sovereigns, corporates and banks potentially amplify shocks (be these adverse or benign) to any of the three sectors. This could potentially impair the smooth transmission of monetary policy because of financial instabilities, credit disequilibria and self-fulfilling price spirals. Similarly, monetary policy itself may have a more pronounced impact on economic activity because of macroeconomic amplification through the sovereign-bank-corporate nexus. In particular, an abrupt tightening of financing conditions carries the risk of triggering an adverse feedback loop, with disproportionate consequences for both output and inflation. In pursuing its primary goal of price stability, monetary policy therefore needs to take into account the possibly non-linear impact of its own policies because of amplification via the sovereign-bank-corporate nexus.

The risk of banking and sovereign crises re-enforcing each other, i.e. a detrimental sovereign-bank nexus, grew further during the sovereign debt crisis. While to some extent strong links tend to exist between the sovereign and the most important sectors of the economy, the EU regulatory framework, including crisis management policies, made a significant contribution to strengthening the sovereign-bank nexus.[91] Recognising these risks, in June 2012, euro area heads of state or government agreed that it was imperative to break the vicious circle between banks

90 See, in particular Masuch, et al. (eds.) (2018). However, while the impact of structural reforms that raise the competitiveness of firms affects output positively in the long run, the short-term impact on output is less clear and depends on the space for monetary policy to provide additional accommodation as well as the credibility of structural reforms (see Eggertsson et al., 2014).

91 See Dell'Ariccia et al. (2018).

and sovereigns, among other measures, by establishing a Single Supervisory Mechanism.[92]

Although the Eurosystem accepts a wide range of assets for its monetary policy operations, public sector debt securities play a key role. As a result, the Eurosystem applies a robust framework for the acceptance of sovereign bonds in its operations. This framework has evolved over time to preserve the Eurosystem's ability to implement monetary policy within the limits of its statutory obligations throughout the challenges faced by sovereign bond markets (see Box 9).

Box 9
Sovereign credit ratings in the Eurosystem's monetary policy implementation framework

The Eurosystem's monetary policy operations make extensive use of euro area sovereign bonds[93] of sufficient credit quality. The Eurosystem implements its monetary policy primarily via outright purchases and credit operations with banks against adequate collateral. For outright purchases of sovereign bonds, credit risk is mitigated mainly through the application of eligibility criteria, due diligence procedures on ratings, and purchase limits. In credit operations, daily valuation and higher haircuts can also be used to mitigate the greater risks of sovereign bonds of lower credit quality. Three features are thus essential: (i) what the minimum eligible credit quality is, (ii) how the credit quality is determined, and (iii) how the Eurosystem avoids cliff effects arising from changes in credit quality.

Minimum credit quality requirements for sovereign bonds in Eurosystem monetary policy operations have evolved over time. Initially, the minimum credit quality threshold for sovereign bonds to be eligible as collateral was set at the "A" level on the basis of the first-best rating. In October 2008, the threshold was reduced to "BBB-" to expand the collateral framework and enhance the provision of liquidity in the context of the financial crisis and a weakening average credit rating of euro area issuers. Since then, the minimum credit quality requirements for sovereign bonds have been adjusted through the introduction of temporary discretionary measures either on a case-by-case basis (i.e. via different country waivers),[94] or for a broader set of assets (i.e. via the eligibility freeze in April 2020).[95]

While the Eurosystem has always used ratings assigned by credit rating agencies (CRAs)[96] to determine the credit quality of sovereign bonds, the ratings are closely scrutinised via an in-depth due diligence process. In line with the Financial Stability Board's principles for reducing reliance on

92 Euro area Summit statement, 29 June 2012.

93 As of December, 2020, 75% of purchases and 18% of mobilised collateral were euro area sovereign bonds.

94 See Bindseil et al. (2017). Such waivers of the credit quality criteria have been applied in the PSPP and for collateral and linked to the existence of a financial assistance programme, entailing conditionality, among others things, on the achievement of fiscal targets, and also linked to market functioning and risk management considerations (including considerations relating to debt sustainability), while the 2020 waiver for Greek sovereign securities for the PEPP was the first waiver that did not have such links in place.

95 Marketable assets that met the minimum credit quality requirements for collateral eligibility on 7 April 2020 ("BBB-") continue to be eligible as long as their rating remains at or above "BB".

96 Initially, the Eurosystem relied on the best rating, which was given by Fitch, Moody's and S&P. Since 2007, the Eurosystem credit assessment framework has provided the rules for monitoring ratings and has included DBRS as a fourth credit rating agency. Some smaller CRAs have publicly stated that they are working towards becoming compliant with the relevant Eurosystem requirements (see Article 120 of Guideline (EU) 2015/510 of the European Central Bank).

CRA ratings,[97] the Eurosystem enhanced the due diligence it conducts on CRAs in the context of the Eurosystem credit assessment framework.[98] The Eurosystem thus continues to use CRAs' sovereign ratings, although it also engages extensively with CRAs and closely scrutinises ratings to better understand them and to disentangle the role of judgement in rating decisions. Within the remit of the due diligence conducted it is confirmed that credit ratings are broader measures of credit risk than debt sustainability analyses, as CRAs consider additional factors when determining the ability and willingness of governments to repay their debts. Some of these factors are qualitative, with judgement playing a significant role, in particular for lower-rated sovereigns. Moreover, monetary policy stance is an important rating driver. For example, CRAs have, in part, viewed membership of a monetary union as a negative rating factor in the case of sovereigns for which economic conditions are not synchronised with the union overall, although membership of the euro area generally benefits a sovereign's monetary and external scores.[99] Additionally, the ECB's policy actions appear to have contributed to preventing a procyclical general downgrading of euro area sovereigns by CRAs in 2020.[100]

The Eurosystem has taken measures to support the smooth implementation of monetary policy in all Member States and has avoided cliff effects, when the Governing Council has considered such measures to be necessary, adequate and proportionate. In-depth reviews of the economic situation of individual countries (e.g. in the context of EU/IMF economic adjustment programmes) and of sovereign ratings have served as the basis for the Eurosystem to use its discretion and deviate from CRAs' ratings when this is warranted, avoiding any mechanistic reliance on these ratings. The measures have been key to ensuring that sovereign bonds' loss of eligibility for monetary policy operations does not push the domestic economy into a self-fulfilling inferior equilibrium in the presence of multiple equilibria. At the same time, the Governing Council has used risk control measures to address the additional risk taking associated with discretionary measures. When the continued acceptance of certain sovereign bonds was considered to violate its statutory obligation to accept only adequate collateral, those assets were no longer accepted.[101]

2.4.3 The sovereign debt crisis

The asymmetries in economic structures, the weaknesses of the banking system, the state of the public finances and the limited space for discretionary fiscal stimulus led to an asymmetric recovery and diverging financing conditions across the euro area after the financial crisis.[102] The fragmentation of the euro area's economy complicated the transmission of the single monetary policy as the increase in sovereign yields translated into higher funding costs for

97 See Financial Stability Board (2010).

98 See Financial Stability Board (2014). For a further explanation of the Eurosystem perspective on this topic, see European Central Bank (2011b).

99 See, for example, Standard & Poor's (2014),

100 For example, Standard & Poor's (2020) argue that their "ratings on the eurozone's sovereigns remain mostly stable on the back of the extraordinary support provided by the ECB".

101 Once developments no longer hinted at the successful conclusion of the EU/IMF programmes such waivers were lifted, as in the case of Greece and Cyprus on several occasions (see Bindseil et al., 2017).

102 See Rostagno et al. (2019) for a detailed discussion of the impact of the financial and economic crisis on monetary policy.

banks, firms and households. This counteracted the benefits stemming from the accommodative stance of the ECB in countries most severely hit by the sovereign debt crisis. In 2011 the euro area fell back into recession.

Between 2010 and 2012, euro area countries representing around one-third of the area's economy were subject to severe stress in their sovereign bond markets – some even lost market access. Greece entered an EU/IMF economic adjustment programme in May 2010 when markets lost confidence in the sustainability of its public finances.[103] In other vulnerable countries, the sovereign-banking nexus continued to strangle the recovery, despite policy innovations such as the establishment of an intergovernmental lending capacity for sovereigns and the European Financial Stability Facility (EFSF), as well as the introduction of the Securities Markets Programme by the Eurosystem. Ireland and Portugal entered an EU/IMF economic adjustment programme in 2010 and 2011 respectively, while Cyprus and Spain requested financial assistance in 2012. The various performance parameters foreseen in the respective programmes have been instrumental in allowing the ECB to waive the minimum credit quality eligibility criteria for these sovereigns in its monetary policy implementation framework.

One of the challenges presented by the euro area sovereign debt crisis was that it involved real-time, incremental, multi-country crisis management.[104] One major concern was the establishment of a safety net that would offer sovereigns protection from rollover risk and belief-driven runs, reduce contagion risks within the euro area, and avoid undermining incentives for national policymakers to pursue sustainable policies. The sovereign bond spreads of vulnerable countries were influenced by political decisions and announcements that changed bondholders' perceptions of the credit risks associated with sovereign bonds.[105] For example, the outcome of the Franco-German summit in Deauville in October 2010, i.e. that financial assistance to sovereigns would require private sector involvement if this were deemed necessary, increased sovereign bond spreads for stressed euro area sovereigns as it signalled greater credit risks (see Box 10). A permanent institutional solution was eventually agreed when the European Stability Mechanism (ESM) was set up in October 2012 as a successor to the EFSF, but with larger financial firepower to provide a backstop for euro area sovereigns, subject to certain conditions regarding fiscal and structural policies.[106]

Another challenge was the concern that strong asymmetries within the euro area could give rise to fears that the euro area would break up. Redenomination risk – the risk that countries might choose to leave the euro area and redenominate their liabilities into a successor currency – started to emerge and began to partly replace credit risk in the pricing of securities issued by stressed jurisdictions. Fiscal

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[103] The depth of the crisis can be accounted for by macroeconomic and financial initial imbalances, see Gourinchas et al. (2017).

[104] See Lane (2012) for a contemporary analysis.

[105] This concerned, in particular, the credibility of national policymakers with regard to pursuing sustainable long-term fiscal policies, as well as the implementation of the "no bail-out" clause (Article 125 of the TFEU).

[106] The ESM can also provide precautionary programmes, intervene in primary and secondary markets in case of exceptional financial market circumstances and risks to financial stability and, as it did for Spain in 2012, extend loans to governments earmarked for the recapitalisation of financial institutions.

authorities tried to restore fiscal sustainability by pursuing fiscal consolidation in 2011-13, while simultaneously strengthening fiscal rules. In March 2012, European countries agreed the Fiscal Compact[107], which introduced national legal requirements aimed at achieving a budget which was in balance or in surplus (with an automatic correction mechanism in the case of potentially significant deviations), and national independent monitoring institutions.

Following the agreement reached on the Fiscal Compact, the ECB acted to prevent fragmentation of the euro area. Backing up President's Draghi pledge in July 2012 that the ECB would, within its mandate, do "whatever it takes" to preserve the euro, the ECB introduced OMTs in the summer of 2012. While OMTs are considered to the extent that they are warranted from a monetary policy perspective, the Governing Council defined strict and effective conditions which would be attached to an appropriate ESM financial assistance programme for the activation of OMTs.[108] The OMT announcement established an explicit link between monetary policy and decisions by fiscal authorities, both at euro area and country level. Overall, it can be viewed as a successful monetary policy intervention as it eliminated the redenomination risk premia without bond purchases actually taking place. However, it was an intervention that was born out of the necessity to prevent the financial fragmentation of the euro area, which had in part been caused by insufficient action on the part of the fiscal authorities and weaknesses in the design of the EMU framework, which had impaired the transmission of monetary policy. Later, in 2015, eligibility for purchases under the public sector purchase programme (PSPP) was conditional on there being positive outcomes of the reviews of ongoing financial assistance programmes, for the sovereign debt securities of countries which did not meet the minimum credit quality requirements (see Box 9).[109]

Fiscal policies became more procyclical during and after the sovereign debt crisis, although the composition of public expenditure was also affected. Public investment, which benefits current and future taxpayers, tends to be politically easier to cut than government expenditure, as the latter benefits only current taxpayers. These considerations become more acute in times of crisis, and public investment was disproportionally reduced during the sovereign debt crisis, only partially recovering afterwards. These investment cuts cannot be attributed to adherence to the common fiscal rules, even though the latter did not contain any specific provisions to protect investment.[110] Although there was no clear relationship between the public investment cuts and adherence to the 3% deficit limit before the

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[107] The fiscal compact is part of the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union, an intergovernmental treaty that entered into force on 1 January 2013. It was signed by 25 countries, of which 22, namely the 19 euro area countries plus Bulgaria, Denmark and Romania, are formally bound by the fiscal compact.

[108] ECB press release, "Technical features of Outright Monetary Transactions", 6 September 2012. One precondition for large-scale purchases of short-term sovereign bonds under OMTs is an appropriate economic adjustment programme agreed between the respective issuer country and the ESM.

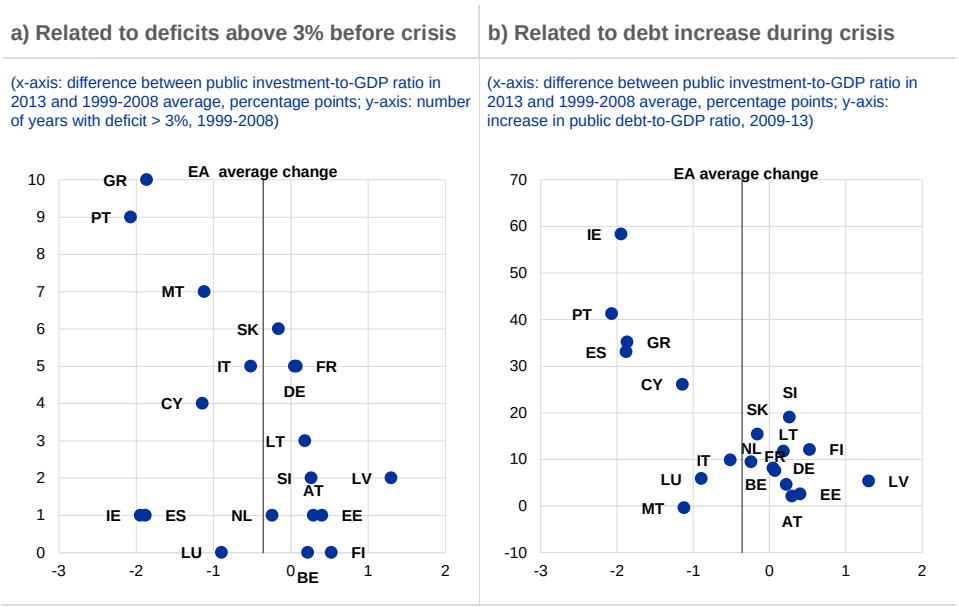
[109] See Articles 3(c) and 3(d) of Decision (EU) 2015/774 of the European Central Bank of 4 March 2015 on a secondary markets public sector asset purchase programme (ECB/2015/10).

[110] The introduction of a type of "golden rule" protection of public investment in the SGP was discussed at its inception but was considered to be difficult to operationalise and unlikely to be effective, despite its intuitive appeal (see Balassone and Franco (2000) and Perée and Välilä, 2005). The European Commission (2020), in its staff working document on the Commission's economic governance review, states that "based on available information, there is only weak evidence that 'golden rules' support public investment and that investment is hampered by fiscal rules."

crisis (see Chart 4, panel a), there was a direct relationship between the severity of the sovereign debt crisis and public investment cuts (see Chart 4, panel b). This relationship was in turn affected by the fiscal and structural imbalances which persisted before the crisis.[111] Since the public capital stock is found to be positively related to private investment and GDP growth in most euro area countries, public investment cuts would be expected to negatively affect potential output.[112]

Chart 4

Fall in public investment after the financial and sovereign debt crises



Sources: ECB, own calculations.

Box 10

Policy determinants of sovereign spreads in the euro area

Yield spreads between euro area countries (sovereign spreads) can usefully be broken down into three components: credit or solvency risk, liquidity risk and redenomination risk. Credit or solvency risk is assumed to reflect market expectations based on macroeconomic fundamentals of losses related to sovereign default (credit risk premia). Liquidity risk premia depend, among other factors, on the size and depth of bond markets, regulation, and investor preferences. Redenomination risk in the case of the euro refers to "the risk that a euro asset will be redenominated into a devalued legacy currency."[113] However, redenomination risk premia can also be viewed as a component of credit risk premia, because a redenomination constitutes a credit event, according to the 2014 ISDA definition. All these components of sovereign spreads vary over time in response to fundamental factors, and may also surge due to non-fundamental factors such as self-fulfilling expectations or run dynamics in times of financial panic.

111 European Commission (2017) found that a 1% increase in the debt-to-GDP ratio is followed by a decrease of the investment-to-GDP ratio of close to 0.1% with, for a given level of public debt, a smaller negative effect in EU Member States with a better quality of governance and/or stronger national fiscal rules.

112 See Dreger and Reimers (2016) and De Jong et.al. (2018).

113 See De Santis (2019).

Economic policy actions can affect sovereign spreads in complex ways. Credit risk premia are affected by market expectations of both national and supranational economic and political fundamentals. They increase to the extent that markets assess there is some probability that a weakening of fundamentals will lead to a default or sovereign debt restructuring which will have to be borne by bondholders. By contrast, news regarding (i) a credible national fiscal consolidation and/or structural reform plan or (ii) supranational action with cross-country transfers or official sector involvement will tend to lower credit risk premia, as the adjustment burden in these cases will fall on future taxpayers and citizens more generally, and not bondholders. Liquidity premia can be mitigated by policies that may be expected to effectively counteract financial panics or self-fulfilling runs. Finally, redenomination risks can be affected by (i) national economic policies which mitigate political instability and, thereby, the risk of an exit scenario, and (ii) action at supranational level (e.g. via expected cross-country risk sharing) which might increase the "skin in the game" at European level, decreasing the probability of a common currency exit.

According to Schwarz (2019), liquidity risk was the dominant factor during the global financial crisis, while credit and redenomination risks were the main factors during the sovereign debt crisis (Gros, 2018). During the latter period, some policy actions can be identified as having probably increased both credit and redenomination risks. For example, the Deauville announcement and concrete preparations for (during 2011) and implementation of (March 2012) the Greek debt restructuring, which reflected the "no bail-out" clause present in Article 125 of the TFEU[114], prompted a lowering of expectations of cross-country risk sharing, and causing a repricing of sovereign risk in some Member States. In mid-2012, "whatever it takes" and the OMT programme lowered redenomination and, possibly, also credit risk premia. The aim of the OMT programme was to safeguard appropriate monetary policy transmission and the "singleness" of monetary policy. A necessary condition for OMT is strict and effective economic conditionality attached to an appropriate EFSF/ESM programme, in order to ensure incentives are adequate and that moral hazard is prevented. This linking of OMT to effective economic policy adjustment may have strengthened expectations of future fiscal consolidation and, therefore, probably also helped to reduce credit risk premia.

Spreads also reacted to economic news and institutional statements at both national and European level. At national level Beetsma et al. (2013) and Bahaj (2020) find that news affecting one particular country can spread to other countries that are seen as risky. In the context of monetary policy, Altavilla et al. (2016) and Ait-Sahalia et al. (2012) find that ECB actions were a key element which reduced yields in periphery countries. Finally, some authors have investigated the effects of news related to the general European governance framework. As an example of this, Bergman et al. (2019) investigated the effects of a set of decisions of European policymakers on banking credit default swaps and sovereign yields. They find that the announcement of fiscal agreements in the European Council can lower sovereign spreads in the periphery.

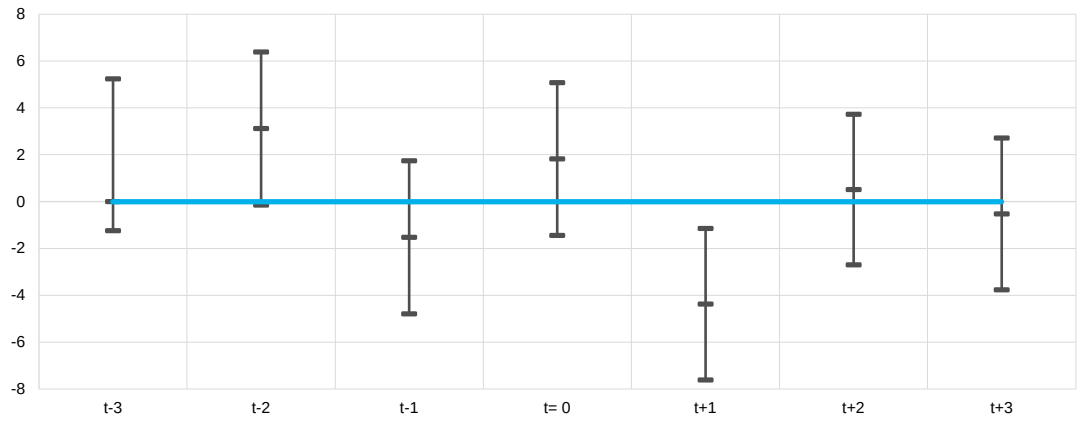
More generally, reforms to the governance framework of EMU have affected sovereign spreads. In particular, reforms increasing the size of financial markets and facilitating cross-country investments can decrease liquidity risk, while the creation of euro area institutions, such as the ESM/EFSF, can increase the probability of official sector involvement and an effective adjustment programme, thus reducing default risk. Moreover, fiscal reforms such as the Fiscal Compact can increase expectations with regard to long-term sustainable policies and, as a consequence, decrease default risk in some cases. Finally, euro area deepening can increase the net benefits of euro area

[114] The article was introduced at EU level to ensure that the responsibility for repaying public debt remains national and that countries pursue sound fiscal policies.

membership and can affect redenomination risk by reducing the probability of a break-up scenario. An example of this is the announcement of the Next Generation EU agreement (Banco de España, 2020).

Chart A

Effect of policy decisions on sovereign spreads in the periphery countries



Source: Authors' own calculations based on Kataryniuk et al. (2021).
Note: The figure shows the average impact (and 2-standard deviation confidence bands) of a set of policy decisions (financial and fiscal) at European level on the sovereign spreads of Ireland, Greece, Spain, Italy and Portugal.

Kataryniuk et al. (2021) provide a quantitative account of the effect of supranational decisions on sovereign spreads. By relying on an extensive narrative of European decisions taken at European Council level, they apply an event analysis to three types of decisions: financial integration, fiscal integration and the capital markets union. Among the financial integration events, they include, among others, decisions related to the creation and reform of the EFSF, the ESM or the banking union. Fiscal integration decisions are related to fiscal and economic surveillance (six-pack, two-pack and Fiscal Compact) as well as the introduction of the budgetary instrument for convergence and competitiveness. They use event-study regressions with daily data to assess the impact of policy decisions on sovereign bond yields. The results for financial and fiscal integration decisions can be seen in Chart A, which shows the change in the sovereign spread of periphery countries around the decision dates, controlling for a large number of variables, including the dates of other fiscal events, bailouts, important European Commission proposals and more traditional controls such as monetary policy dates, stock market prices or the VIX (the Chicago Board Options Exchange's volatility index). They find that decisions on EU deepening drive down periphery spreads, mainly through a decrease in periphery sovereign yields. This effect is smaller for decisions regarding the capital markets union than for decisions regarding other financial integration.

2.5 The decline of the natural rate of interest in the euro area

2.5.1 The decline of the natural rate of interest

Before the global financial crisis, the natural rate was already on a protracted downward trend. According to a wide range of estimation methods, the natural rate has been declining in many countries since the 1980s due to demographic changes, low trend growth, a global savings glut, increased wealth inequality and risk aversion.[115]

The global financial crisis and the euro area sovereign debt crisis and its aftermath had an additional negative effect. These crises affected the saving and investment decisions of households and firms, which are among the determinants of the natural rate, through a worsening of future income prospects and financial conditions.[116] Fiscal structural policies, such as the presence of sound, sustainable and predictable pension schemes and the provision of an adequate public capital stock, also influence investment and precautionary saving decisions. Estimates for the euro area point to a fall in the natural rate of interest from over 2% at the beginning of EMU to levels below zero ahead of the COVID-19 pandemic.[117]

The decline of the natural rate endangered the effectiveness of monetary policy in the euro area. Monetary policy cannot counteract the structural forces depressing the natural rate, which require reforms supporting productivity growth and targeting the adverse economic consequences of demographic trends. However, a low or negative natural rate reduces the space available for interest rate policy to operate in a downturn. While providing monetary accommodation to the economy in the low interest rate environment, the ECB has been effective in deploying non-conventional monetary measures. Possible side effects of these policies on the functioning of financial markets have been the subject of much debate.[118]

Sovereign interest rates also moved down in the lower interest rate environment. From 2015 onwards, the (average) nominal euro area sovereign yield was lower than nominal growth, which led to calls to rethink the fiscal framework (Blanchard et al., 2021). The advantages of low debt financing costs need to be weighed against the risks and social costs associated with future adverse shocks[119] such as reversals of the interest rate-growth differential (see Box 11), and against possible adverse incentive effects (see Box 12).

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115 See Section 1.2.1 and Deutsche Bundesbank (2017).

116 See Rodriguez Palenzuela and Dees (eds.) (2016).

117 For estimates of the natural rate and a broader discussion of the drivers of its fall, see Work stream on macroprudential policy, monetary policy and financial stability (2021) and Brand et al. (eds.) (2018).

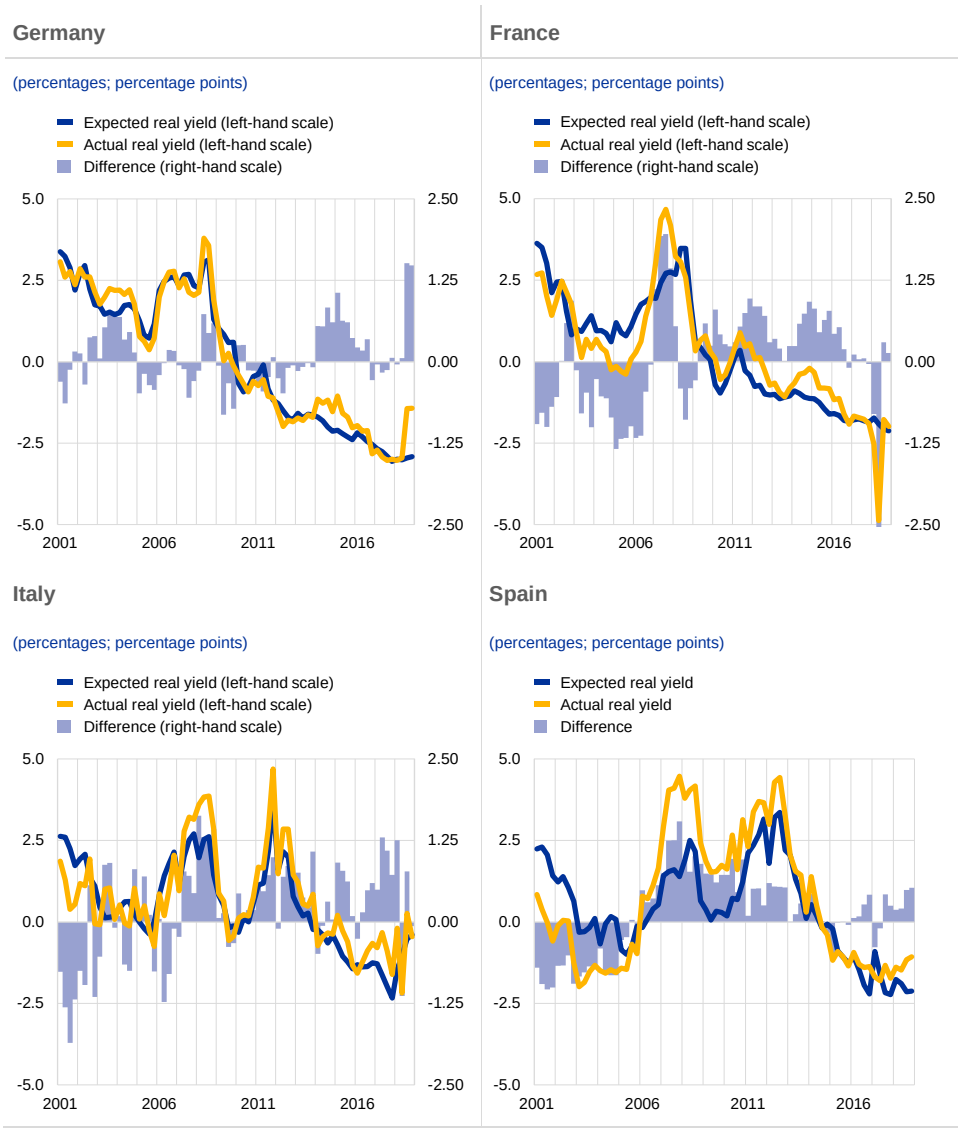
118 See, for example, European Systemic Risk Board (2016).

119 Jiang et al. (2020) show that governments face a trade-off between insuring their bondholders by making their debt risk-free and insuring their taxpayers and transfer recipients against adverse macroeconomic shocks, "… making government debt safer requires raising more tax revenue as a fraction of GDP from taxpayers in bad times. The larger the sovereign debt burden, the steeper this trade-off becomes."

Due to the asymmetries between euro area countries, the reduction in sovereign interest rates was not uniform. Euro area real interest rates moved into negative territory, although not all to the same extent and at the same time. Spanish real two-year sovereign yields went negative in 2015, five years later than German yields did (see Chart 5).

Chart 5

Real two-year sovereign yields, actual and ESCB staff projections, Q1 2001-Q4 2018



Source: ESCB.
Notes: Two-year sovereign interest rates deflated by the geometric average of the realised GDP deflator two years ahead, and the projected GDP deflator two years ahead (ESCB Staff projections).

Box 11

The interest rate-growth differential on government debt in the euro area: trends and determinants

The difference between the average (implicit) nominal interest rate[120] that governments pay on their debt and the nominal growth rate of the economy, the interest rate-growth differential ($i-g$), is a key variable for debt dynamics and sovereign sustainability analysis. The current projections of long-lived negative $i-g$ tend to alleviate sustainability concerns, including those related to the sharp rise in government debt-to-GDP ratios induced by the pandemic.

From a historical perspective, while periods of negative $i-g$ have not been uncommon (albeit subject to sample specification), most of the theoretical and empirical literature has so far assumed or inferred that $i-g$ should be positive in the longer run, at least in advanced economies that are closer to their steady-state. A debate over the role of fiscal policy with a persistently negative interest rate-growth differential for the United States was revived by Blanchard (2019). Mauro and Zhou (2020) also point out that negative differentials have occurred more often than not in both advanced and emerging economies over a long period of up to 200 years. However, the average (and median) $i-g$ in advanced economies for the longest period covered in the sample (before WWII) and for the most recent period (after 1980) are positive. It is mainly the post-WWII period and the high inflation years in the 1970s that drive the negative averages. Wyplosz (2019) concludes that $i-g<0$ has not been the norm for advanced economies (since the 1960s), while Barro (2020) notes that this inequality holds over the long run[121] for the marginal risk-free rate, proxied by the return on short-term (three-month) treasury bills, albeit not for treasury bonds (around a ten-year maturity) particularly since 1960. Finally, several papers warn that the deficit bias implies that debt tends to increase even in periods of negative differentials, with the associated risks.[122]

For the mature euro area economies (the first 12 members), as well as for most of the other advanced economies, differentials have been mostly positive on average since the early 1980s and over the period of EMU. High-debt countries have tended to have higher differentials. For the euro area aggregate, $i-g$ was close to 1 percentage point on average in the period 1999-2019. It has turned negative since 2015 (Table A). The COVID-19 crisis brought a surge in the differentials for 2020 as GDP growth dipped, with record, albeit temporary, levels for all countries.

Table A

Interest rate-growth differential on euro area aggregate debt over different EMU sub-periods

i-g	Overall period 1999-2019	Period before great financial crisis (GFC) 1999-2007	Period of GFC 2008-11	Period after GFC 2012-19	Recent period 2015-19
EA-19 aggregate	0.8	0.6	2.8	0.1	-1.0

Notes: Authors' calculations based on the European Commission's AMECO dataset (spring 2020). Period average of $i-g$ as defined above.

120 Calculated as the ratio of government interest payments in year *t* and the debt stock in *t-1*.

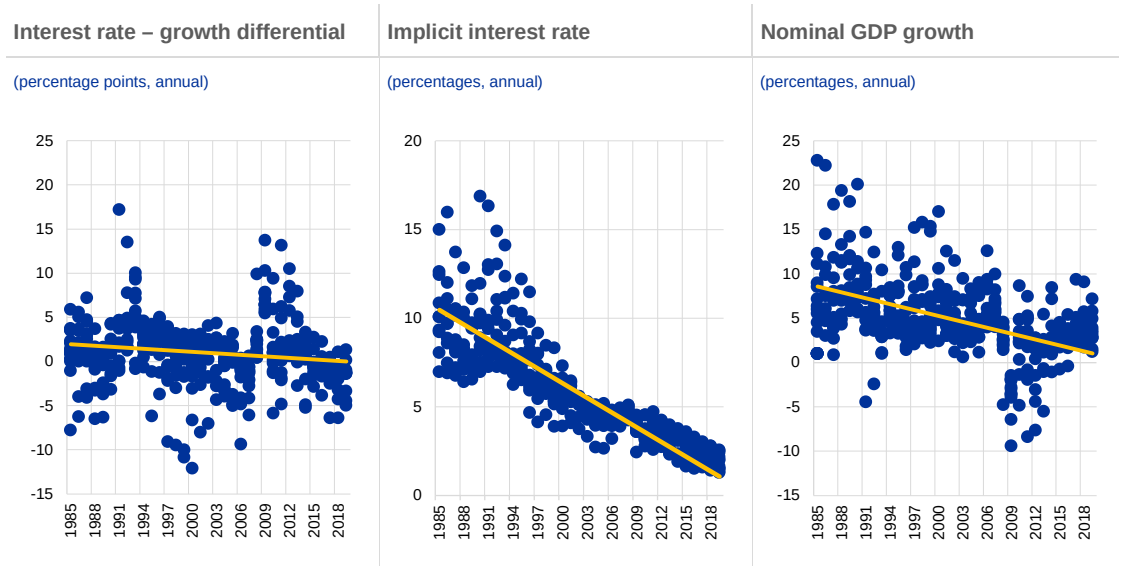
121 Since 1870 or, more recently, since 1960, on average, for a sample of 14 OECD countries with available data.

122 See, among others, Mauro and Zhou (2020), Lian et al. (2020) and Rogoff (2020). On the other hand, Barro (2020) starts from the evidence of i<g for the (short-term) risk-free rate and shows that this would not signal dynamic inefficiency in a disaster-risk model. Yet the model would still need to satisfy the no-Ponzi game condition for government finance (a rise in safe assets from increased government T-bills is matched by an increase in the safe (certain) present value of liabilities associated with net taxes).

The secular trends affecting r* (see Section 2.5.1) also affect, at least in part, potential (and nominal) growth. Thus, the average cross-country $i - g$ differential on government debt has followed a less pronounced decline and has showed no apparent trend until recently. Chart A illustrates these dynamics for the mature euro area economies (EA-12).

Chart A

Interest rate-growth differential across EA-12 over 1985-2019



Source: Authors' calculations based mainly on the European Commissions' AMECO dataset (Spring 2020 vintage).
Note: EA-12 comprises Belgium, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal and Finland.

An empirical analysis[123] of the factors driving the differential over the period of EMU finds that higher public debt burdens, increases in public debt, as well as higher primary deficits are associated with higher interest rate-growth differentials, even after controlling for the position in the economic cycle. The impact of a high debt burden on $i-g$ can feed through both channels, i.e. (i) higher yields (spreads) and (ii) lower (long-term) growth. As concluded in Burriel et al. (2020), high-debt economies tend to lose more output in a crisis and are adversely affected in terms of potential (long-term) output, with more significant impairment in the case of a large sovereign risk premia reaction. Furthermore, the differential increases significantly in bad economic times, which signals that any deviations from baseline "steady-state" scenarios may quickly bring $i-g$ into highly unfavourable territory. For the period of EMU, monetary policy loosening has been associated with a lower differential, while a tightening, proxied by an increase in short-term interest rates or a decline in monetary policy assets, would induce an increase in $i-g$. Technological progress, or any other factors that increase total factor productivity growth, produce a decrease in $i-g$. The global savings glut originating from emerging economies seems to have depressed $i-g$ (conversely, a reversal would increase it). The impact of demographic ageing is more difficult to disentangle. A

123 See Checherita-Westphal and Domingues Semeano (2020). The paper also provides a wide range of descriptive statistics on $i-g$ for the euro area and other advanced economies. On the determinants of $i-g$, contrary to the findings of other papers, inflation volatility is not found to be a robust variable for the period of EMU. Inflation is found to be negatively associated with $i-g$, but not highly statistically significant across models. The paper also provides a panel BVAR forecast exercise. This suggests that $i-g$ differentials for the majority of the mature euro area economies (EA-12) will probably remain negative and well below the historical average after the COVID-19 crisis, although they will increase over the medium term. Furthermore, high-debt countries consistently present the highest (and a larger probability of positive) differentials. For similar conclusions over a longer horizon, see Box 18.

higher dependency ratio is found to be associated with lower $i-g$, whereas slower population growth tends to increase the differential.

Overall, while $i-g$ is currently projected to remain negative over the medium to longer run, this analysis urges fiscal caution given the risk of $i-g$ reversals, especially for the high-debt countries.

Box 12
The incentive effects of monetary policy on fiscal policy behaviour

Weakened fiscal discipline is one potential negative side effect associated with a monetary policy which keeps interest rates low. By keeping public funding costs low over a sustained period of time, such a policy could incentivise governments to increase deficit spending or reduce their efforts to pursue fiscal consolidation. Reduced fiscal discipline could, in turn, leave governments more exposed to debt servicing and refinancing problems once interest rates rise because of monetary policy normalisation. Such a scenario could potentially pose a threat to monetary dominance as the central bank might face a challenging trade-off between price stability and debt stabilisation (see Section 1.1).

This box uses a quantitative model to explore whether concerns over such adverse fiscal incentive effects might be justified. To avoid the Lucas critique, an analysis of the impact of low-interest-rate policies on fiscal incentives requires a framework that includes optimising and forward-looking fiscal policymakers. The present analysis accounts for this by modelling public debt management and sovereign default as the outcome of an intertemporal policy problem.[124] The stylised model considers the government of a single country within a monetary union and is calibrated based on a subset of euro area countries.[125] The government acts under discretion, is not bounded by a fiscal rule, and finances public spending through tax revenues and by issuing long-term government bonds. To match empirically observed public debt-to-GDP ratios, the model assumes that the government is impatient (i.e. it exhibits a deficit bias).[126] Public spending provides utility directly, is purely consumptive and does not, therefore, affect growth perspectives. Since the government cannot commit to honouring its future obligations, the price of its debt reflects the extent to which the incentive to default varies with the level of debt, as well as with tax revenues and the real risk-free rate, which both fluctuate randomly over time. The real rate represents the opportunity cost for risk-neutral bond market investors. By interpreting variations in the real rate as being due to

[124] The model is based on recent quantitative models of sovereign debt and default in the spirit of Eaton and Gersovitz (1981) that are applied to countries in the euro area (see Hatchondo et al., 2016; Bocola and Dovis, 2019; Bocola et al., 2019). See Röttger and Gerke (2021) for further details.

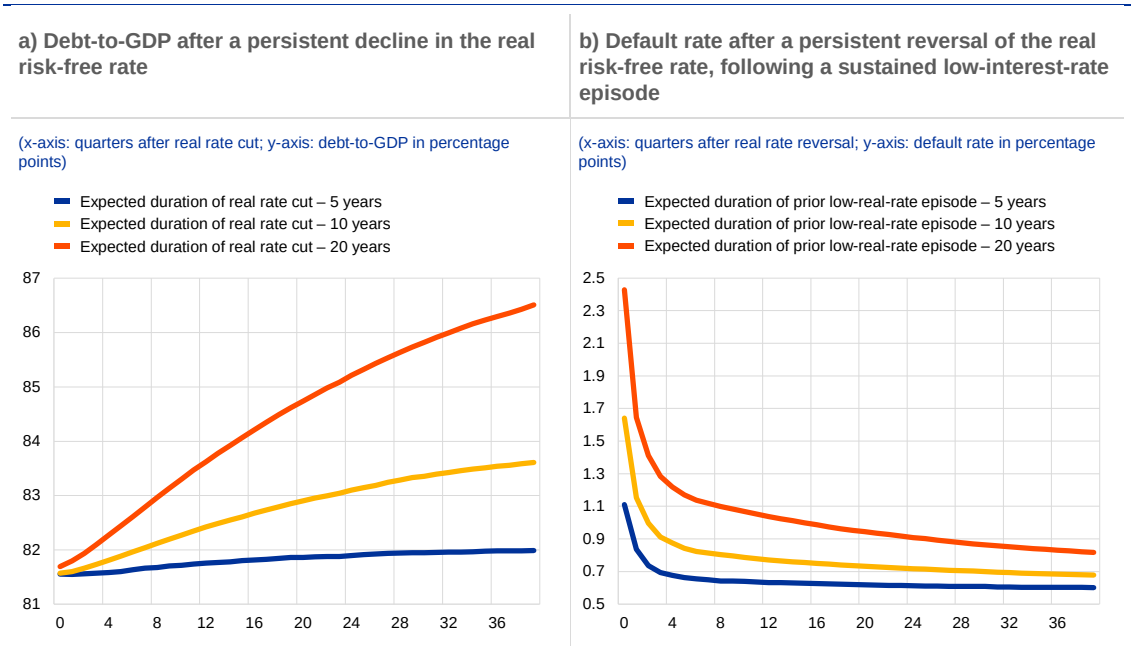
[125] This box assumes monetary policy in general and interest rate policy in particular to be exogenous, so there is no feedback from the model economy to monetary policy. The model itself does not, therefore, capture the risk of fiscal dominance, as it implicitly assumes monetary dominance. The exogeneity assumption is consistent with the notion that monetary policy does not respond to country-specific developments in the monetary union. While debt management and default risk premia are modelled in a fairly detailed way, the macroeconomic environment is highly stylised and abstracts from endogenous business cycle and inflation dynamics.

[126] The assumption of an impatient government is standard in the sovereign default literature. It can be motivated by political economy considerations (see Alesina and Tabellini, 1990; Battaglini and Coate, 2008), which provide the most prominent explanation for the increase in public debt observed for advanced economies over the last few decades (see Yared, 2019). Compared with applications that look at emerging economies, the degree of impatience is, however, quite modest here, with a quarterly government discount factor of 0.9745.

monetary policy, the model makes it possible to assess the fiscal response to exogenous changes in monetary policy.[127]

Chart A

Response of public debt to a persistent interest rate decline and reaction of default rate to subsequent interest rate normalisation



Source: Authors' own computations based on the model in Röttger and Gerke (2021).
Notes: Period 0 in panel a marks the switch from the normal-interest-rate regime to the low-interest-rate regime. By contrast, period 0 in panel b marks the return back to the normal-interest-rate regime after the low-interest-rate episode referred to in panel a. To facilitate the comparison of different scenarios, the low-interest-rate episode prior to the interest rate reversal is simulated for the same number of periods (40 quarters) for all expected durations displayed in the chart. Debt-to-GDP is expressed as the face value of beginning-of-period public debt over annual GDP. The displayed values are averages across simulated model economies. The default rate is defined as the proportion of simulated periods that featured a default following a persistent real rate increase. It is calculated based on observations up to the respective time period on the x-axis. Since panel a displays beginning-of-period debt, the first value of all depicted debt paths equals the respective average value prior to the real rate cut (i.e. during "normal times"). The average values for the default rate in the period prior to the interest rate reversal are 0.46% (5-year duration), 0.38% (10-year duration) and 0.36% (20-year duration).

The quantitative analysis shows that the fiscal incentive effects of low-interest-rate episodes depend crucially on how long they are expected to last. After a decline in the real rate which is expected to be long-lived and could be interpreted as central bank forward guidance ("lower for longer"), the government takes advantage of improved funding conditions, runs a (primary) deficit and accumulates more debt. Importantly, the magnitude of the fiscal response to a real rate reduction and a subsequent reversal back to the rate's previous level increases with the expected duration of the real rate reduction. This result is shown in panel a of Chart A, which plots the response of public debt (as a percentage of GDP) to a persistent interest rate decline.[128] The interest rate cut improves public funding costs directly by lowering investors' opportunity costs and indirectly by lowering the default risk premium, which reflects investors' rational expectations that the government has a lower incentive to default in the near future. Although the interest-rate-growth

[127] While various factors affect real risk-free interest rates in reality, the literature frequently uses exogenous changes in the real risk-free rate to study how monetary policy affects economic outcomes (see, for example, Martinez-Miera and Repullo, 2021; McKay and Wieland, 2021).

[128] The time paths displayed in Chart A are averages for the respective variables. These averages are calculated based on simulations of the model that feature the same time path for the real risk-free rate but different shock realisations for tax revenues. Interest rate shocks are modelled via a regime-switching process with two persistent regimes for the real risk-free rate. In the "low-interest-rate regime", the real rate is 1 (annual) percentage point below the respective value in the normal-interest-rate regime, which equals 0.4%.

differential turns negative after the real rate reduction, the debt position goes up in response since the impatient government uses the improved financing conditions to increase current spending.[129]

The build-up of public debt in response to a persistent interest rate reduction implies that the government is more likely to default once interest rates go up again. As shown in panel b of Chart A, the higher the expected duration of the prior low-interest-rate episode was, the higher the default probability will be following a subsequent and persistent interest rate normalisation. While a "lower for longer" monetary policy can reduce sovereign risk in the short run, the model suggests that this reduction might come at the expense of a debt build-up that could increase the default risk when interest rates experience a persistent reversal.[130]

Although the model only considers a single country within a monetary union, the results have direct implications from a monetary union perspective. In particular, although they are not present in the model, adverse spillover effects from a default in one country on other member countries offer a rationale for a regulatory framework at monetary union level that addresses the issue of default, both from an ex ante and an ex post point of view.[131] In the absence of such a framework the possibility of default could reduce the scope for interest rate increases in situations in which the objective of price stability calls for such measures.

2.5.2 Procyclical fiscal policies following the sovereign debt crisis

When measured in relation to the change in the output gap, fiscal policies remained largely procyclical before the pandemic. From 2011 to 2013, the strong consolidation in Member States (at risk of) losing fiscal sustainability was complemented overall, rather than offset, by the fiscal policies of countries with a lower level of fiscal constraints, as most countries had (following the crisis) high deficit ratios and elevated debt levels.[132] At the lower bound, fiscal multipliers are likely to be higher than with monetary policy away from the lower bound (see Section 1.3.2). The same holds for fiscal spillovers between euro area countries, which results in the impact of simultaneous consolidation in the euro area being greater than consolidation in one country (see Box 13). From 2015 to 2019, fiscal

129 See Wyplosz (2019) for a discussion of how a deficit bias can counteract the stabilising impact of a negative interest-rate-growth differential on public debt dynamics. Bloise and Vailakis (2020) show how a negative interest-rate-growth differential can theoretically give rise to self-fulfilling debt crises that will be absent if the interest rate exceeds the growth rate.

130 Note that Chart A displays the averages for the variables across all model-based time series. The response of the variables under consideration to changes in the real rate can be more (less) pronounced if we look only at a subset of simulated time series for which economic performance – as measured by tax revenues – is below (above) average. Note also that for computational reasons the model-based analysis abstracts from a number of potentially relevant features. In particular, tax revenues are exogenous in the model and are therefore unaffected by changes in the real rate or in the default risk premium. If a decline in these variables has a positive effect on tax revenues, a persistent real rate reduction would probably lead to a less pronounced debt build-up. However, a subsequent real rate increase would, in this case, also lower tax revenues and therefore amplify the default risk. Furthermore, the model assumes that the government cannot use its financial resources for public investment, which could have positive long-run growth effects. Given that the model assumes an impatient government it is, however, not obvious that the government would indeed use improved financing conditions for investment rather than for consumption.

131 See Deutsche Bundesbank (2015).

132 The effect that such an adjustment would have on economic growth was initially underestimated, as measured by the fiscal multipliers assumed in European fiscal surveillance (see Górnicka et al., 2018).

policies turned countercyclical in more countries as GDP growth and unemployment figures improved, although this never represented more than half of the euro area economy (see Chart 3, panel a).

The SGP is not designed to support monetary policy in a lower bound environment in which monetary and fiscal policies can become strategic complements rather than substitutes. In addition to financial market pressures and difficulty in distinguishing in real time between vulnerable and less vulnerable sovereigns, the fiscal framework did not make it easier to achieve a more balanced policy mix. The fiscal rules are asymmetric and are intended to ensure sustainable fiscal policies are in place by preventing excessive deficits, but without provisions guaranteeing a fiscal contribution to macroeconomic stabilisation at euro area level. According to the original architecture of EMU, the euro area fiscal stance is simply the sum of the fiscal stances at national level. Furthermore, the consensus view is that fiscal policy was supposed to help stabilise output and employment but not inflation, which had been delegated to the independent monetary policy authority.

More focus over time on the euro area fiscal stance did not translate into policy changes. Economic conditions did lead to more attention being paid to the euro area fiscal stance.[133] This also led to an institutional change as the "two-pack" regulation set up the European Fiscal Board (EFB), giving it the task of advising the European Commission on the appropriateness of the euro area fiscal stance. However, the stance continued to reflect national priorities, rather than heed the EFB's recommendations.[134]

Box 13
Fiscal expenditure spillovers

This box summarises recent estimates and simulations of fiscal expenditure spillovers in the euro area, based on different models.[135] Using different models offers the benefit of combining empirical findings, both for euro area countries individually and as a group, with simulations that make it possible to investigate the factors influencing the magnitude of spillovers. The first empirical approach consists of estimating the average spillover effect among 11 euro area countries, using a panel vector autoregression (PVAR) model based on annual data since 1972. The second empirical approach focuses on the individual spillovers among the four largest euro area countries, using VAR models which are based on a new quarterly dataset. Finally, a multi-country dynamic stochastic general equilibrium (DSGE) model (EAGLE) [136], specifically calibrated

133 The Five Presidents' Report (European Commission, 2015) highlighted a need to reflect on ways to ensure that "the sum of national budget balances leads to an appropriate fiscal stance at the level of the euro area as a whole". For a discussion of the euro area fiscal stance and its role in European fiscal surveillance, see Bańkowski and Ferdinandusse (2017) and European Central Bank (2016).

134 For example, in its assessment of the prospective fiscal stance appropriate for the euro area in 2019, the EFB recommended a neutral fiscal stance for the euro area as a whole, which could be achieved through the implementation of differentiated national fiscal policies within the parameters of the SGP. Countries with fiscal space – in the sense that they have exceeded their medium-term budgetary objectives for public finances – should use it while consolidation continues in other countries – especially those with high government debt-to-GDP ratios.

135 Based on Alloza et al. (2020).

136 See Clancy et al. (2016) and Gomes et al. (2012).

to simultaneously analyse the four largest euro area countries, was used to investigate fiscal spillovers, and in particular their interactions with monetary policy.

Table A

Empirical estimates of destination spillovers in the euro area

(two-year cumulative multiplier)

Method	SVAR					PVAR		
Countries	DE	FR	IT	ES	EA#	EA		DE, FR, IT, ES
Sample	Q1 1980 – Q4 2016					1972 – 2017	1980 – 2017	1980 – 2017
Average destination spillover	0.73	0.50**	0.00	0.32**	0.46	0.42*	0.38*	0.02

Notes: Average destination spillover measures the output response to a €1 average government spending increase in the other euro area countries. # euro area average based on the output-weighted average of the SVAR results, which probably represents an upper bound as this average is based on adding the estimated effects of fiscal shocks that might not have taken place at the same moment in time; * denotes significance at the 68% level; ** denotes significance at the 95% level.

The empirical results show positive fiscal spillovers among euro area countries. The average destination spillover measures the effect of an average €1 spending increase in the other three euro area countries included in the structural vector autoregression (SVAR) estimates. For the four largest euro area countries, the output-weighted average spillovers are 0.46 in the second year (see Table A). This is broadly comparable with the results of the PVAR estimates (0.42), which are based on annual data for 11 euro area countries. The similarity between both sets of results is confirmed with PVAR multipliers estimated on a sample with the same starting year (1980). In this case the result is 0.38. There is considerable heterogeneity across the individual country estimates and the differences between both sets of estimates become somewhat larger when the SVAR results are compared with the PVAR estimates based only on the four largest euro area countries. The SVAR results suggest that spillovers are higher when interest rates react less to the government expenditure shock. These results are broadly comparable with previous empirical studies, which find that heterogeneity in the results is related to trade links, the state of the economy and the reaction of monetary policy.[137]

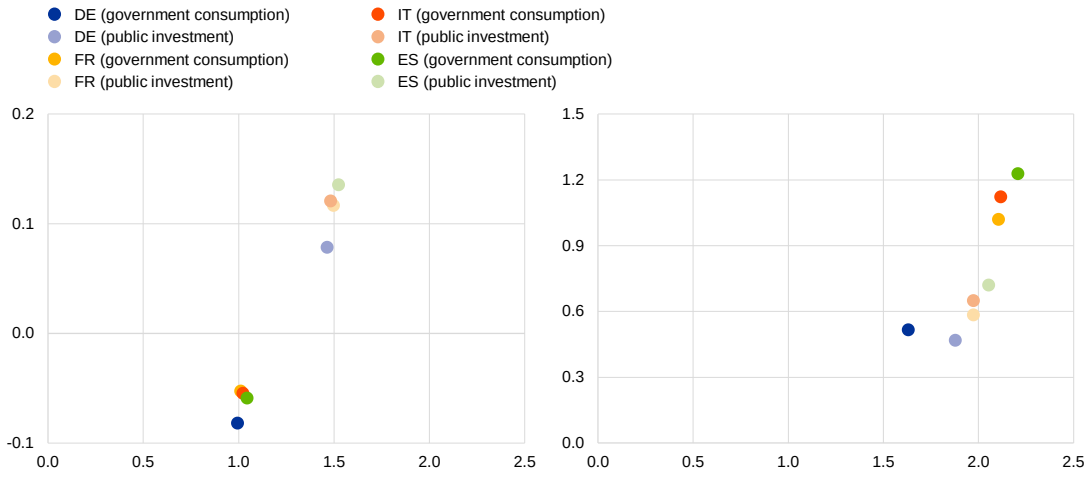
The reaction of monetary policy is an important determinant of the magnitude of fiscal spillovers. The EAGLE simulations illustrate that the composition of government expenditure has implications for the magnitude of spillovers, with productive government investment providing larger spillovers than consumption when interest rates react to the fiscal shock (see Chart A, left panel). For government consumption, the destination spillovers are on average slightly negative during the first two years, mainly because the demand effect of the fiscal stimulus is offset by the contractionary impact of higher interest rates – this applies to all countries in the monetary union. When interest rates in the euro area do not respond to the fiscal shock and remain fixed for two years, both domestic output effects and spillovers are much larger than in the case of reactive monetary policy (Chart A , right panel). This suggests that fiscal spillovers could play a greater stabilising role in the euro area cycle if the efficacy of monetary policy instruments is lower than it is during normal times. However, even if the magnitude of spillovers is higher in these circumstances, it remains less than the possible stabilising effect of transfers from other countries, assuming that such countries have spending multipliers which are comparable to domestic fiscal multipliers.

[137] Different data samples and fiscal identification and estimation methods complicate the comparison with other papers. See Alloza et al. (2020) for a more detailed discussion.

Chart A

Destination spillovers, with reactive interest rates (left panel) and non-reactive interest rates (right panel)

(x-axis: two-year average percentage change in GDP in countries propagating the fiscal stimulus; y-axis: two-year average percentage change in GDP in recipient country)



Source: EAGLE model.
Notes: The panels show destination spillover, i.e. the impact of a simultaneous increase in government consumption or public investment by 1% of GDP for two years in all but one country on the countries' domestic output (x-axis) and on the country receiving the spillovers (y-axis).

Simulations show how more patient fiscal policies would have affected economic outcomes.[138] These backward-looking counterfactual scenarios for the euro area as a whole compare the actual behaviour of fiscal policy (scenario "estim"), with fiscal policy reacting more countercyclically to the output gap (scenario "countercyc."), and to scenarios in which fiscal policy would have been more patient in pursuing debt sustainability and would have provided more support for macroeconomic stabilisation by taking (past) output losses into account in a lower bound environment (scenario "patient"). The simulations have been run using the semi-structural ECB-BASE model and complement the forward-looking scenarios outlined in Chapter 3 of this report, which contains a description of the model.[139] The reaction of fiscal policies in these scenarios is concentrated in three expenditure categories: government purchases, transfers and public investment.

Fiscal policies responding in a more countercyclical manner would have smoothed the real output gap and reduced the inflation gap. Compared with the baseline, less fiscal spending before the great financial crisis would have dampened the positive output gap (see Chart 6, panel a) and reduced the debt-to-GDP ratio (see Chart 6, panel d). In the absence of an inflation gap during those years, the results are similar for both alternative scenarios. After the financial crisis, and abstracting from financing difficulties during the sovereign debt crisis, additional fiscal spending would have ensured quicker closure of the output gap and a smaller inflation gap (see Chart 6, panel b), with a strongly positive output gap for the patient fiscal policy scenario. The additional spending in response to the double dip results

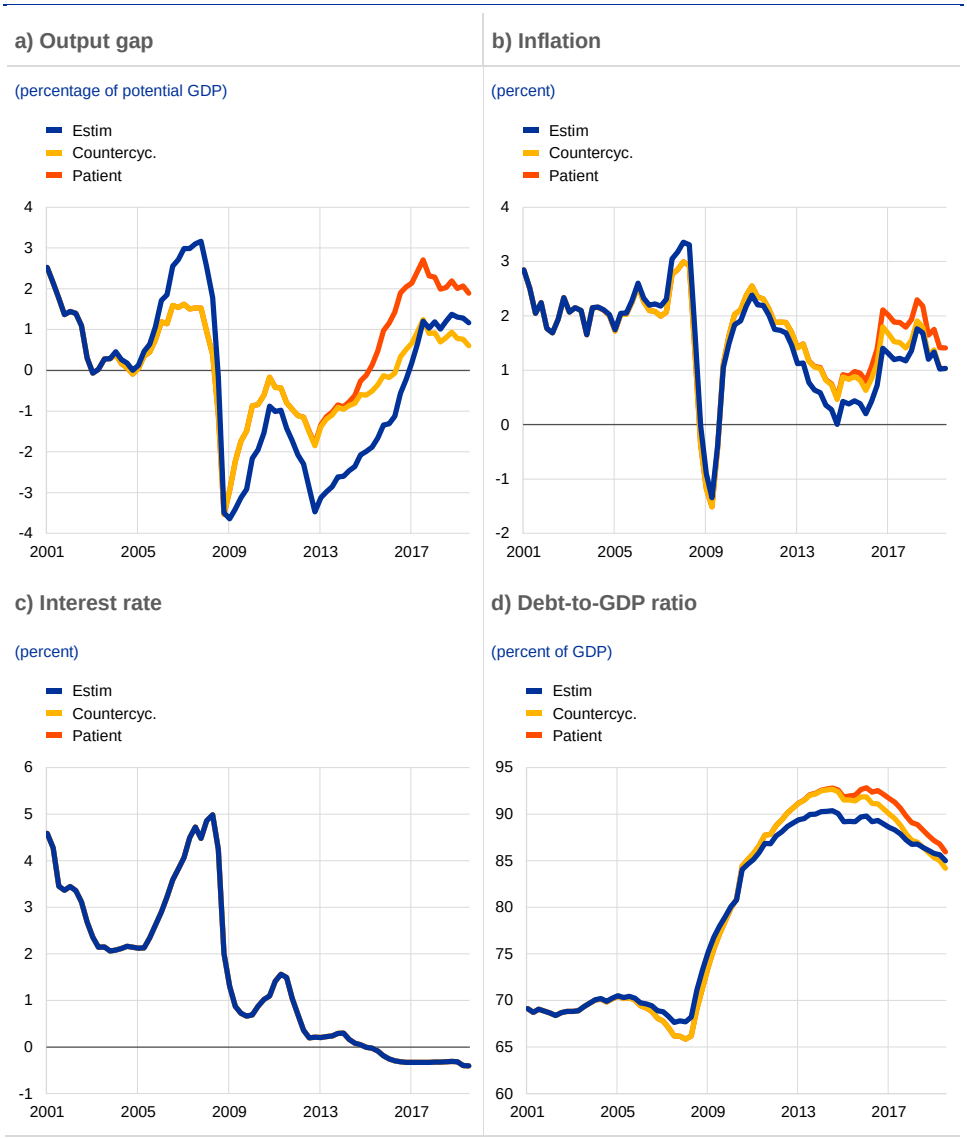
138 For more details see Bańkowski et al. (2021b).

139 The "patient" fiscal policy scenario can be formulated as a fiscal reaction function that, in addition to a more countercyclical stance, makes up for past real output losses or, additionally, takes nominal output losses into account and it activates at the lower bound.

in a deterioration in the budget balance and debt accumulation. However, these effects were to some extent mitigated by stronger consolidation before the crisis (as the assumed stronger countercyclical stance of fiscal policies applies both in upswings and downturns), and the positive denominator effect of higher nominal output growth.

Chart 6

Simulations of alternative fiscal rules under exogenous monetary policy



Source: ECB-BASE simulations.
Note: The potential GDP used for the calculation of the output gap and the budget balance-to-GDP ratio is taken from the European Commission's Spring 2021 Economic Forecast.

These simulations are illustrative and are subject to a number of caveats. The simulations take the perspective of the euro area in aggregate and do not take possible adverse effects of more expansionary fiscal policies on sovereign financing conditions for individual euro area countries into account. Furthermore, the monetary policy reaction is kept exogenous, i.e. interest rates and non-conventional measures are not changed on the basis of historical experience (see Chart 6, panel c). While

this makes it possible to focus on the maximum impact of a more countercyclical or patient fiscal policy in isolation, the impact of fiscal sustainability concerns during the sovereign debt crisis or a monetary policy reaction in response to a more expansionary fiscal stance are not taken into account.[140]

2.6 Changes in the architecture of EMU

Compared with its original set-up, the architecture of EMU has been adapted to incorporate some of the lessons learned from the crises experienced over the past two decades. Following the financial and sovereign debt crises, reforms were implemented in the areas of economic, fiscal and financial policy. However, in all these areas, there are reforms that are still a work-in-progress or over which political consensus had still not been reached when the pandemic struck.

EU economic governance has been reoriented to prevent macroeconomic imbalances. With a view to enhancing resilience and minimising negative spillovers among Member States' economies (especially those sharing a single currency and monetary policy), the European Semester and the macroeconomic imbalance procedure were introduced. While the macroeconomic imbalance procedure includes sanctioning mechanisms for euro area countries, these have never been used.

The fiscal rules have been reformed every five years, on average. The reforms seek to strengthen the enforcement of fiscal rules and introduce more flexibility to take macroeconomic development, structural reforms and investment into account.[141] Independent fiscal institutions have been set up in all Member States to provide scrutiny of fiscal policies and improve the national anchoring of the common fiscal rules.[142] Since 2016, the European Fiscal Board had been advising on EU fiscal surveillance and on the appropriate euro area fiscal stance. However, in February 2020, on the eve of the pandemic, the European Commission launched a review of economic surveillance in the EU, including ways to make the SGP less complicated and more effective.

Several policy initiatives have been launched since the sovereign debt crisis to reduce risks in the banking sector and the likelihood of contagion spreading from banks to sovereigns. First, as part of the EU banking union[143], a new European supervisory regime was set up, including a comprehensive asset review at the start of the Single Supervisory Mechanism. In addition, the Single Resolution Mechanism was established for more orderly resolution operations for failing banks, including the bail-in of private creditors as foreseen in the Bank Recovery and Resolution Directive. Secondly, the capital markets union was launched to integrate

140 In Chapter 3, the forward-looking simulations based on the same model also take alternative monetary policy reaction functions into account.

141 See Kamps and Leiner-Killinger (2019); European Central Bank (2012); European Central Bank (2004).

142 See European Central Bank (2013).

143 See European Commission (2015).

national financial systems in a genuine single market.[144] Nonetheless, on some measures, such as the introduction of the European Deposit Insurance Scheme[145] or the regulatory treatment of sovereign exposures, consensus could not be reached at either international or European level.[146]

[144] These policy initiatives are laid down in the 2015 Communication from the Commission "Action Plan on Building a Capital Markets Union" (COM/2015/0468) and the 2020 Communication from the Commission "A Capital Markets Union for people and businesses - new action plan" (COM/2020/590).

[145] Proposed by the Commission in 2015 (COM/2015/0586).

[146] See the Report of the EFC-High Level Working Group on the Regulatory Treatment of Sovereign Exposures for more information on measures adopted in the EU.

3 The COVID-19 crisis and post-pandemic challenges for monetary-fiscal policy interactions

3.1 Introduction

This final chapter of the report begins by reviewing monetary and fiscal policy developments triggered by the COVID-19 crisis. It then takes a look ahead and discusses the post-pandemic options and challenges for monetary and fiscal policy interactions in the euro area from the perspective of monetary policy.

The pandemic has reinforced existing challenges for the interaction of monetary and fiscal policy in the euro area. Developments prior to the arrival of the COVID-19 shock in early 2020 (see Chapter 2), particularly in the years after the financial crisis, had exposed significant shortcomings in the architecture of Economic and Monetary Union (EMU). In addition, years of persistently low inflation and a declining natural rate of interest had challenged aspects of the pre-crisis consensus on how monetary and fiscal policy should interact. Meanwhile, the fiscal policies and heterogeneous growth performance of member countries had created a very uneven distribution of fiscal space. Given these legacies, the COVID-19 pandemic has unfolded in a situation in which the economy has been away from a desirable steady state. Instead, the pandemic has reinforced existing policy challenges and revealed still unresolved weaknesses both in national fiscal and economic policies and in the EMU architecture.

3.2 COVID-19 crisis – overview of monetary and fiscal developments

The COVID-19 pandemic has led to monetary and fiscal policy decisions that are far-reaching in both size and scope. Two aspects are worth mentioning upfront. First, as regards the appropriate policy mix, the pandemic should be seen as an exceptional common shock with strong spillovers and, at the same time, potentially heterogeneous effects across countries, sectors and types of household. In view of these characteristics, the crisis has first and foremost required a targeted and substantial fiscal response, supported by monetary accommodation, with strong complementarities between monetary and fiscal policies. Notably, at the effective lower bound (ELB) with (persistently) too low inflation, monetary policy (i) benefits from efficient fiscal stabilisation and (ii) can enhance fiscal effectiveness by maintaining low policy rates for some time, thereby supporting fiscal multipliers and creating fiscal space, in line with the notion of “strategic complementarity”. As discussed in Section 1.3.2, this complementarity, prevailing in the current lower bound environment, is state-contingent. While expansionary policy measures at the lower bound can reinforce each other, this does not call into question standard

assignments of separate policy objectives to be achieved by monetary and fiscal policymakers over time. Second, as regards institutional challenges, the exceptional situation of the pandemic has created a strong sense of cross-country solidarity. In 2020 the European fiscal landscape saw profound improvements, most visibly reflected in the agreement on the Next Generation EU (NGEU) package. The package strongly supports more vulnerable EU Member States through a one-off shared budgetary instrument at European level (with the allocation key determined on the basis of past unemployment and growth figures).

3.2.1 Monetary policy aspects of the COVID-19 crisis

The outbreak of COVID-19 presented a series of challenges for the ECB in terms of ensuring smooth monetary policy transmission and adopting the appropriate monetary policy stance. First, following the outbreak of the COVID-19 pandemic, euro area financial markets exhibited extreme volatility, with signs of severe dislocations due to a deterioration in risk sentiment, illiquidity and rising fragmentation. Asymmetric fiscal legacies across member countries of the euro area further exacerbated this adverse market reaction. By mid-March 2020 these developments had led to a sharp tightening in financing and bank funding conditions, which risked impairing the smooth transmission of the ECB's monetary policy across market segments and jurisdictions. It was therefore vital for the ECB to intervene forcefully to ensure market functioning, avert a widespread liquidity crisis and prevent a self-fulfilling market panic. Second, these developments introduced significant downside risks to the euro area inflation outlook, aggravating the existing challenge for the ECB to ease the monetary policy stance to counter persistently low inflation.

The ECB's monetary policy response was centred around two key pillars, the first being additional asset purchases. In response to the COVID-19 crisis, the Governing Council first decided to add a temporary envelope of additional net asset purchases of €120 billion to its asset purchase programme (APP). In combination with the existing APP, the temporary envelope was aimed at supporting favourable financing conditions for the real economy. However, the situation soon deteriorated significantly owing to the rapid spread of COVID-19 across the euro area. The Governing Council therefore decided on 18 March 2020 that an additional forceful monetary policy response was warranted. Specifically, it decided to launch a new temporary asset purchase programme – the pandemic emergency purchase programme (PEPP) – with an initial envelope of €750 billion. In the course of 2020, the envelope was expanded twice and now stands at €1,850 billion.

The PEPP was tailored to the specific nature of the COVID-19 crisis to serve a dual purpose, namely exercising a market stabilisation function and supporting the stance function of monetary policy. First, the PEPP can be operated as a market backstop to prevent destabilising financial dynamics and breakdowns in monetary transmission. Purchases under the PEPP can be conducted flexibly, allowing for fluctuations in the distribution of purchase flows over time, across asset classes and among jurisdictions. The flexible design of the PEPP,

together with the support of collateral easing measures to counter adverse procyclical feedback effects (see Box 9), ensures that it can fulfil a market stabilisation role benefiting all member countries of the euro area, especially in view of the high uncertainty associated with the effects of the pandemic.[147] Second, purchases under the PEPP suppress long-term interest rates and thereby support the overall monetary policy stance that is necessary to ensure that medium-term price stability is protected. The two functions of the PEPP have been activated with varying intensity.

The targeted longer-term refinancing operations (TLTROs) were the second major pillar of the ECB's COVID-19 crisis response. Specifically, the terms and conditions of the TLTRO III programme were eased and adapted by (i) temporarily reducing the interest rate on the operations, (ii) conducting additional operations and (iii) raising the total amount that counterparties are entitled to borrow. The purpose of these amendments was to reinforce the inbuilt incentive for banks to lend to firms and households. This makes the TLTROs a natural complement to the PEPP, as the operations concentrate on the downstream phases of monetary policy transmission – those that work through banks and more directly reach the enterprises which are most reliant on bank financing.

The monetary policy response to the COVID-19 shock reinforced the use of the Eurosystem balance sheet as an instrument both to affect the stance of monetary policy and to ensure a smooth transmission mechanism. The experience with the PEPP and TLTROs illustrates the flexibility of the ECB's monetary policy toolkit in addressing contingencies as they arise so that the ECB can fulfil its mandate. This flexibility has allowed the Eurosystem to use the size and composition of its balance sheet in a targeted way. The aim is to stem risks to the transmission mechanism, preventing an inappropriate tightening of financing conditions and easing the overall monetary policy stance. However, the strong expansion of the balance sheet also brings to the fore the challenges related to the potential adverse side effects of monetary policy.[148]

3.2.2 Fiscal policy aspects of the COVID-19 crisis

Fiscal policy is the most suitable instrument for addressing the detrimental impact of the pandemic on the economy. First, fiscal policies can help in dealing with the health consequences of the pandemic. Second, they can alleviate the negative impact of the crisis by bolstering aggregate demand and providing well-targeted and differentiated support to vulnerable households and firms. The provision of liquidity support through tax deferrals and state guarantee schemes, along with the use of short-time working schemes, helps to preserve those firms and

147 A more detailed investigation of the interactions between, on the one hand, the effectiveness of fiscal policy and, on the other, the treatment of sovereign bonds in the collateral framework and their eligibility for asset purchase programmes could be the subject of future work but is not addressed in this work stream.

148 In response to the pandemic, the Eurosystem balance sheet has increased substantially and currently stands at close to €5.4 trillion (according to data as at the end of February 2021) compared with close to €3.3 trillion prior to the pandemic (according to data as at the end of February 2020).

employment relationships that would not otherwise have survived the lockdown. In addition, government investment is important for the post-pandemic economic recovery as it can help raise potential growth, thereby strengthening debt sustainability.

Euro area countries have relied extensively on fiscal policy to counter the harmful impact of the COVID-19 pandemic on their economies.[149] Overall, fiscal policies have supported the euro area economy in two ways: through the functioning of automatic stabilisers and through discretionary action. In general, the automatic stabilisers (see Box 7) are effective and sizeable[150] in euro area countries, accounting for around one-third of the large budget deficit in 2020. However, the severity of the COVID-19 crisis, with both demand and supply significantly affected during lockdowns, has meant that significant discretionary fiscal support measures have been needed.[151]

Euro area aggregate discretionary stimulus in response to the COVID-19 crisis amounted to around 4.25% of GDP in 2020, according to estimates made in the March 2021 macroeconomic projection exercise (MPE). The budgetary impact of discretionary fiscal measures is unprecedented compared with previous crisis episodes. By way of comparison, at the height of the global financial crisis in 2009, the overall amount of discretionary stimulus in EU countries amounted to 1.5% of GDP.[152] The discretionary stimulus for 2021 is estimated at 3.25% of GDP (including NGEU-funded spending) with emergency support to firms and short-time working schemes still playing an important role. From 2021 onwards, measures providing emergency support are projected to be gradually phased out, with a shift towards measures supporting the recovery. Annual discretionary stimulus of about 1.5% of GDP (including NGEU-funded spending) is projected over the period 2022-23. The overall envelope of the government guarantees granted/supplied in 2020 amounts to around 17% of GDP at the aggregate euro area level. Envelope sizes and take-up rates differ substantially across countries.

The EU's response to the COVID-19 crisis has been unprecedented, significantly complementing national fiscal measures. The extent of the crisis and the fact that not all EU Member States have the same fiscal room for manoeuvre has meant that an EU response over and above the national responses can support the recovery and reduce the risk of fragmentation in the EU. The EU's response has been tailored to the challenges arising in the different phases of the crisis. The activation of the general escape clause of the Stability and Growth Pact (SGP) was one of the key immediate initiatives. The triggering of this clause, which was introduced as part of the "six-pack" reform of the SGP in 2011, drawing on the

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149 For a more detailed description of the initial fiscal policy responses, see Haroutunian et al. (2021).

150 See European Central Bank (2020a).

151 The discretionary fiscal support consists of a broad range of measures. Some have an immediate budgetary impact, while others, such as liquidity measures, are, in principle, not expected to cause an immediate deterioration in the fiscal outlook. Fiscal emergency packages have been aimed at limiting the economic fallout from containment measures through direct measures to protect firms and workers (mostly through short-time work schemes) in the affected industries. At the same time, extensive liquidity support measures in the form of tax deferrals and state guarantees have helped particularly hard-hit firms to avoid liquidity shortages.

152 See European Commission (2010).

lessons from the economic and financial crisis of 2008-09, allows for a coordinated and temporary deviation from the usual fiscal requirements of the SGP for all Member States, provided that this does not endanger fiscal sustainability in the medium term. The aim of the general escape clause is to ensure the flexibility needed for Member States both to undertake the measures required to contain the impact of the pandemic and potentially to provide more general support through further discretionary stimulus and coordinated action. Meanwhile, three safety nets were established to support Member States' measures for workers and businesses and to safeguard countries' access to financing, amounting to a package worth €540 billion.[153] Finally, the largest component of the EU response was the establishment of NGEU, the €750 billion temporary instrument to support the post-pandemic economic recovery, most notably in the less performing and more vulnerable Member States. The NGEU funds will be disbursed up to the end of 2026, with the aim being to frontload them until 2023. They will be repaid by 31 December 2058 at the latest. According to the March 2021 MPE, NGEU-funded spending is estimated at around 0.5% of GDP in 2021 and is to be broadly maintained over the period 2022-23.[154]

Box 14, which accompanies the above discussion, considers aspects of the fiscal-monetary policy mix in a stylised monetary union model in response to a COVID-19-type shock which affects both the demand side and the supply side of economies.

Box 14

The COVID-19 shock and a fiscal-monetary policy mix in a monetary union

This box, based on Bartocci et al. (2020), examines the macroeconomic effects of monetary and fiscal policy interaction across regions belonging to a monetary union in response to a pandemic shock.[155]

The analysis builds on a New Keynesian monetary union model calibrated to the euro area. The central bank sets the policy rate according to a Taylor rule, subject to the ELB (the duration of which is endogenous), and announces long-term sovereign bond purchases for monetary policy purposes. In each region, the local government exogenously sets transfers and public consumption spending and stabilises public debt in the medium and long run according to a fiscal rule (that requires changes in lump-sum taxes).

For the sake of simplicity and without loss of generality, the two regions in the monetary union, labelled "home" and "foreign", are calibrated symmetrically. In each region, a share of households do not have access to financial markets and, in every period, consume all available income, composed of wages and government transfers (these are known as "hand-to-mouth" (HTM) households).

[153] These include the temporary Support to mitigate Unemployment Risks in an Emergency (SURE) programme, providing financial assistance of up to €100 billion in the form of loans from the EU to the Member States affected, the European Stability Mechanism's Pandemic Crisis Support credit line and the European Investment Banks's pan-European guarantee fund.

[154] The NGEU-funded spending is mostly financed through grants, with only Greece having some of its spending financed through NGEU loans.

[155] The box shows the macroeconomic interactions between fiscal and monetary policies but does not evaluate the specific measures adopted during the COVID-19 crisis.

In the simulations, the COVID-19 shock is represented as a combination of large recessionary demand and supply shocks that suddenly and extensively reduce both economic activity and inflation symmetrically in each region. The central bank responds by lowering policy rates down to the ELB.

Overall macroeconomic effects will depend on the monetary and fiscal measures adopted. An expansionary fiscal and monetary policy mix is crucial for sustaining economic activity.

Fiscal policy in the home region contributes to sustaining domestic aggregate demand by temporarily increasing transfers to HTM households and public consumption for four quarters. Each spending item is increased by 2% of before-shock GDP and is financed by issuing public debt. The fiscal response has positive spillover effects on foreign economic activity thanks to the trade channel. In the fourth quarter of the simulation, the implicit fiscal multipliers of home and foreign GDP are 0.9 and 0.2 respectively (see Table A). Relative to the “no fiscal stimulus” scenario, the home and foreign inflation rates would increase by 0.4 and 0.3 annualised percentage points respectively in this scenario. Macroeconomic conditions in each region and in the overall monetary union would improve further if the foreign region implemented the same fiscal measures as the home region. In each region the implicit output multiplier would be equal to 1.1 and, compared with the “no fiscal stimulus” scenario, inflation would increase by 0.8 percentage points.

The central bank provides further monetary accommodation through purchases of long-term sovereign bonds for monetary policy purposes. Reducing the outstanding amount of these securities causes long-term interest rates to decrease. Lower interest rates induce households to increase investment in physical capital and consumption. Aggregate demand improves, thus attenuating the deflationary effects of the pandemic shock. In this scenario, the output multiplier would be equal to 1.4 in each region and, compared with the “no fiscal stimulus” scenario, the inflation rate would increase by 1.5 percentage points.

Simultaneous cross-country fiscal expansions are less effective if the sovereign spread increases in one region (home). The increase may or may not be related to changes in home fundamentals, e.g. a higher public debt-to-GDP ratio or pessimistic beliefs on the part of investors respectively. In one simulation, it is assumed that there is an exogenous increase in the home sovereign spread equal to 50 basis points on average in the first year, which is fully and immediately passed through to the financing conditions of the home private sector. The increase in the interest rate limits the increase in private consumption and investment activities after the simultaneous home and foreign fiscal stimuli relative to the “no fiscal stimulus” scenario. Home and foreign output multipliers would be equal to 0.8 and 1.0 respectively (or 1.1. in the case of stimulus without the spread increase), while inflation would increase by 0.5 percentage points (instead of 0.8 percentage points) relative to the “no fiscal stimulus” scenario. The effectiveness of fiscal policy in the whole area can be preserved with a safe bond issued by the supranational fiscal authority (which also implements the stimulus instead of the regional fiscal authorities).

Table A

Simulation results: output multipliers

	Home output multiplier	Foreign output multiplier
Home fiscal stimulus	0.9	0.2
Home + foreign fiscal stimuli	1.1	1.1
Home + foreign fiscal stimuli + purchase programme	1.4	1.4
Home + foreign fiscal stimuli + home spread	0.8	1.0
Home + foreign fiscal stimuli with supranational bond	1.1	1.1

Source: Bartocci et al. (2020).
Note: The implicit multiplier is computed as the difference, in the fourth quarter, between output with fiscal stimulus and output without fiscal stimulus, divided by the size of fiscal stimulus (in the fourth quarter the fiscal stimulus ends and, in the "no stimulus" scenario, output achieves its trough).

3.3 Monetary-fiscal policy interactions: challenges ahead from a monetary policy perspective

This concluding section takes a forward-looking view of policy challenges. It reviews options for monetary-fiscal policy interactions and discusses the benefits and challenges from the ECB's perspective, with a focus on maintaining central bank independence and credibility and on the ramifications for price stability. Apart from in the brief concluding observations (see subsection 3.3.3), the discussion takes the EU institutional architecture as given.

3.3.1 Near-term challenges within the pandemic period

Until the health crisis is resolved, the nature of the pandemic shock continues to call for a policy mix which puts fiscal policy at centre stage, with monetary policy acting as support. For the duration of the pandemic, forced constraints on private demand imply that monetary policy accommodation cannot reach those sectors of the economy that need it most. Fiscal policies targeted at the households and firms affected can instead respond directly where help is most needed. In addition, fiscal policy can break "paradox of thrift" dynamics in the private sector when uncertainty is high, for instance through transfers and by providing social insurance. In this pandemic-induced environment of low inflation, monetary policy plays a key supporting role by ensuring favourable financing conditions for the whole economy, both in the private and the public sector.

A premature withdrawal of supportive policies should be avoided. Continued uncertainty implies that policy should remain supportive until the recovery has become safe, solid and self-sustained, and inflation has robustly converged towards the ECB's objective. Limiting economic scarring effects from the crisis will be important for ensuring a sustainable and broad-based economic recovery and a transition to a solid growth path. On the fiscal side, this requires continued flexibility for a supportive and targeted fiscal impulse, backed by a credible commitment to ensuring long-term debt sustainability and addressing known structural weaknesses. As regards monetary policy, a commitment to preserving favourable financing conditions for a longer period, guided by the ECB's price stability objective, sends a

clear signal to governments not to underspend relative to the scale of the shock or withdraw fiscal stimulus too early out of fear that borrowing costs will tighten prematurely.

3.3.2 Challenges for monetary-fiscal policy interactions in a post-pandemic low natural rate environment

There will be various challenges for monetary-fiscal policy interactions in a post-pandemic low natural rate environment, with the starting point being the ELB situation that we are currently witnessing, featuring persistently low inflation outcomes relative to the price stability objective.

As long as euro area inflation is not robustly anchored to the inflation objective, the goals of monetary and fiscal policy continue to be naturally aligned in the post-pandemic period. In an environment where the natural rate of interest is estimated to remain close to, or even below, zero, and inflation remains below the aim, accommodative monetary policy and expansionary fiscal policy continue to complement each other and should remain in place for as long as is necessary for them to achieve their respective goals.

As regards monetary policy, the ECB has already communicated through its current formulation of forward guidance that it will remain accommodative for an extended period of time. The current formulation indicates that policy rates are expected to be kept at their current or lower levels until the inflation outlook has been seen to robustly converge with the inflation aim within the projection horizon, and such convergence has been consistently reflected in underlying inflation dynamics. Net purchases and reinvestment under the APP are linked to the rate path.

For years to come, the Eurosystem balance sheet, with protection from the necessary safeguards, will offer a valuable degree of intertemporal flexibility for the conduct of price stability-oriented monetary policy. Since individual non-standard measures, when looked at in isolation, are prone to diminishing effectiveness and are subject to constraints, it remains to be seen how the appropriate monetary policy stance might best be supported in the future through a combination of standard and complementary non-standard measures. From today's perspective, various combinations are conceivable.

As regards fiscal policies, a common understanding has already emerged among European policymakers on the need for continued fiscal support with a view to ensuring a sustainable and even economic recovery following the pandemic. The effective absorption of funds from the EU's Recovery and Resilience Facility (RRF) to promote growth through high quality of public finances and structural reforms at the Member State level will be crucial in that respect. In addition, the general escape clause of the Stability and Growth Pact will continue to

be applied in 2022 and is expected to be deactivated as of 2023, which ensures flexibility for a supportive fiscal impulse also in 2022.[156]

The main fiscal challenge is to ensure the countercyclicality of fiscal policies, both now and in good times, while preserving debt sustainability. Currently, public finances benefit from the global environment of structurally low interest rates favouring benign interest rate-growth differentials, reinforced by the accommodative stance of monetary policy. Looking ahead, it is crucial that fiscal policies also show countercyclicality in good times. If inflation developments call for a normalisation of monetary policy, requirements regarding the sound fiscal position of all Member States will become more stringent over time, in line with the assignment of objectives underlying the Treaty on the Functioning of the European Union.

Over the longer term, and importantly for monetary policy, it should be recognised that fiscal policy measures can lift the natural rate. This would create additional space for monetary policy and temper the need for non-standard measures as well as mitigating balance sheet risks. Examples include measures that reduce precautionary savings and the demand for safe assets (see Chapter 1), possibly linked, in specific cases, to pension reforms.[157] Likewise, growth-friendly fiscal expenditures tend to increase productivity. Since most of the factors depressing the natural rate are slow-moving, hard-wired and structural, they are not incorporated into the simulations discussed below. Further work would be needed to quantify their magnitude (while direct contributions from fiscal policy measures to inflation are addressed in Box 6).

Moving on from these qualitative points, the remainder of this section draws on quantitative scenarios and model-based support.

First, scenarios are put forward to illustrate interactions between lift-off dates for short-term rates and the balance sheet dimension of monetary policy (see subsection 3.3.2.1). The scenarios, drawing on market and survey-based expectations, offer benchmarks but do not systematically feed back to fiscal developments.

Next, taking a general equilibrium perspective, a main scenario for the euro area is described. Under this scenario, monetary policy and fiscal policy can support a recovery and ensure that inflation is brought back smoothly to the level at which it is to be maintained over the medium term in line with the objective (see subsection 3.3.2.2). The characterisation of the main scenario for the euro area as a whole builds on illustrative simulations using the ECB-BASE model, which is anchored in actual data developments and explores two particular

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156 In addition, it has been indicated that country-specific situations will continue to be taken into account after the deactivation of the general escape clause in the event that Member States do not recover to reach the pre-crisis level of economic activity.

157 Using a life-cycle model of heterogenous agents, analysis for the euro area on the economic impact of population ageing and pension reforms has found that measures that increase the retirement age tend to decrease precautionary savings, thereby increasing the natural rate of interest (r*). By contrast, measures that increase the contribution rate or reduce the benefit ratio at unchanged retirement age tend to increase precautionary savings, thereby reducing r*. See Nerlich and Schroth (2018). Addressing safe asset scarcity in the euro area would require reforms combined with other measures, as indicated in the concluding section. For a general discussion of the determinants of r* in the euro area, see Brand et al. (eds.) (2018).

modelling variations that are suitable for addressing the strategic complementarity between monetary and fiscal policies at the lower bound.[158] On the one hand, as regards policy rules, the ECB-BASE model can be employed to analyse the interaction of different fiscal and monetary policy rules. This means that the analysis allows for active contributions not only from monetary policy but also from fiscal policies, comparing an estimated fiscal reaction for the euro area (as used in Chapter 2 above) with alternative fiscal reaction functions which are more strongly countercyclical or also allow for "patience" through an additional reaction to real or nominal past output losses, activated at the lower bound. On the other hand, as regards the formation of expectations, the analysis carried out with the ECB-BASE model allows for strongly backward-looking expectations as opposed to forward-looking expectations. This feature strengthens the ability of fiscal policies to provide shorter-term macroeconomic stabilisation (since the future implications of the intertemporal budget constraint as captured by Ricardian equivalence are not fully internalised by consumers and firms), while mitigating the effectiveness of strongly forward-looking channels of monetary policy. These two variations, taken in combination, enrich the range of trade-offs that are relevant for the design of appropriate policy rules, complementing findings from other strategy review work streams which have put more weight on forward-looking expectations, with no emphasis on monetary-fiscal policy interactions.[159] Of course, these simulations should not be interpreted literally as concrete policy suggestions (especially for fiscal authorities), but rather as the results of an illustrative tool for understanding certain characteristics of monetary-fiscal policy interactions that may be relevant in the future.

Finally, three types of risk to this main scenario are reviewed: (i) stochastic simulations are used to indicate the scope for a more pronounced undershooting of the inflation objective, resulting from negative tail events around the baseline, or a faster return of inflation to its objective, resulting from positive tail events; (ii) given that the particular version of the ECB-BASE model employed here has limited ability to capture sustainability concerns, separate tools (including the ESCB's debt sustainability analysis tool) are used to discuss forces which could over time favour a regime of fiscal dominance, likely to be associated with financial stability risks; (iii) a separate section addresses risks of country-specific developments that, if left unaddressed, may challenge the sustainability of sovereign debt. The first two types of risk are addressed at the level of the euro area (see subsection 3.3.2.3), while the third risk involves considerations at the level of member countries (see subsection 3.3.2.4).

Three general comments are worth making with regard to the subsequent sequential presentation of quantitative scenarios with model-based support. First, as discussed in Section 1.3.2, the strategic complementarity between monetary and fiscal policies, which prevails at the ELB, is not a permanent feature. Instead, it is state-contingent, is to be reassessed over time depending on the inflation outlook and does not call into question standard assignments of separate policy objectives to

[158] See also the discussion in Chapter 2. For all details concerning the ECB-BASE model, see Bańkowski et al. (2021b).

[159] See Work stream on the price stability objective (2021) and Altavilla et al (2021).

be achieved by monetary and fiscal policymakers. Second, the area-wide fiscal stance (as addressed by the ECB-BASE model) masks sizeable heterogeneity of fiscal positions at the level of member countries (as addressed separately in subsection 3.3.2.4). It remains a key modelling challenge to address these two dimensions jointly in an appropriately specified multi-country euro area setting (where, by construction, the area-wide fiscal stance would be consistent with the contributions from the fiscal positions of member countries and with the effects of monetary policy operating at the euro area level). Third, compositional aspects of public spending should be more strongly analysed in future work, ideally in combination with a heterogenous agent setting, with the intention of offering a richer discussion of the demand and supply-side effects of fiscal policies and of determining the quantitative implications for the natural rate of interest.

3.3.2.1 The balance sheet dimension of monetary policy

The Eurosystem balance sheet offers intertemporal flexibility for the conduct of price-stability oriented monetary policy. To illustrate this, market and survey-based expectations may offer an interesting benchmark for the construction of a baseline scenario. Around this baseline one can think of a range of scenarios, running from optimistic scenarios (with early lift-off dates for short-term interest rates and fewer purchases) to pessimistic scenarios (with late lift-off dates and more purchases), depending on the outlook for price stability. Box 15 considers balance sheet implications of the three scenarios described below, with a focus on the (sharing of) financial risks, buffers and net income.

The baseline scenario constructed for illustrative purposes shows projections of the path of Eurosystem asset holdings into the future, based on expectations held by analysts in spring 2021. These expectations would be consistent with a full exhaustion of the PEPP envelope within the envisaged duration of the programme and with continued net asset purchases under the APP (Chart 7, panel a) and a gradual phasing-out of these holdings over subsequent years. The short-term interest rate in the baseline scenario is assumed to remain around its current levels for the next two-and-a-half years (Chart 7, panel b) and to lift off only sluggishly in the years thereafter. This interest rate path would not only be consistent with prevailing survey-based projections but also with the forward rate path implied in the overnight index swap (OIS) curve.

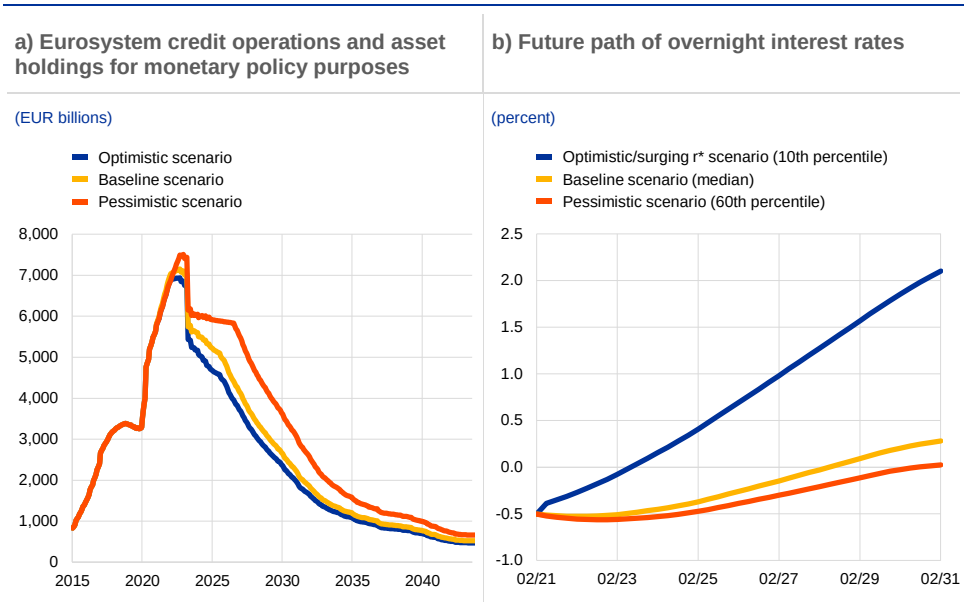
In addition, two alternative scenarios are considered, based on altered expectations about the Eurosystem's future asset holdings and rate paths. In a more pessimistic macroeconomic scenario, which assumes more downbeat expectations relative to the baseline, the Eurosystem's asset portfolios are expected to grow to even higher levels and to remain there for an extended period. In addition, interest rates are projected to evolve at even lower and flatter levels than in the baseline scenario, while the ELB imposes a natural limit on the future rate paths. By contrast, a more optimistic macroeconomic scenario may warrant much more rapid rate increases relative to the baseline. In such a scenario, economic dynamics may change more structurally, and monetary policy rates may have to adjust to an

increased natural real rate of interest (r*). In line with such a rapidly improving economic environment, Eurosystem net asset purchases may come to an end sooner, and the stock of purchases may roll off somewhat faster than assumed in the baseline scenario.

While useful for illustrative purposes, long-term scenarios solely based on market and survey-based expectations call for clear caution when interpreting the results, as they cannot account for possible future changes in the ECB's reaction function. In particular, the underlying macroeconomic assumptions may change much more rapidly than currently expected, and from today's perspective there is no longer-term mechanical relationship between the price (interest rate) and quantity (asset purchase) dimension of the ECB's policy measures, as the effectiveness of all monetary policy instruments is constantly reassessed. In addition, the market and survey-based expectations scenarios used for this illustration do not feed back to fiscal developments, in contrast to the models reviewed in subsequent sections.

Chart 7

Three scenarios for Eurosystem credit operations and asset holdings for monetary policy purposes (panel a) and the future path of overnight interest rates (EONIA) (panel b)



Source: ECB calculations. Notes: Panel a: Across scenarios, Eurosystem asset holdings under the APP and PEPP vary with respect to the maximum portfolio size, the horizon of net asset purchases and the reinvestment of redeeming principal payments. Amounts of Eurosystem credit operations are assumed to be the same across all scenarios and are calibrated to survey-based evidence. Panel b: The projected path of overnight interest rates is based on the OIS-implied EONIA forward curve. In the optimistic (pessimistic) scenario, the interest rate path is set to the euro overnight index average (EONIA) forward rate path implied by the 10^{th} (60^{th}) percentile of its option-implied density. The asymmetry between the optimistic and pessimistic scenario around the baseline scenario shown in panel b of the chart is ultimately due to the ELB. While rates and term premia cannot go arbitrarily low, a case can be made for a faster-than-currently-expected tightening (in response to a rising inflation rate and/or an increase in r*).

Box 15

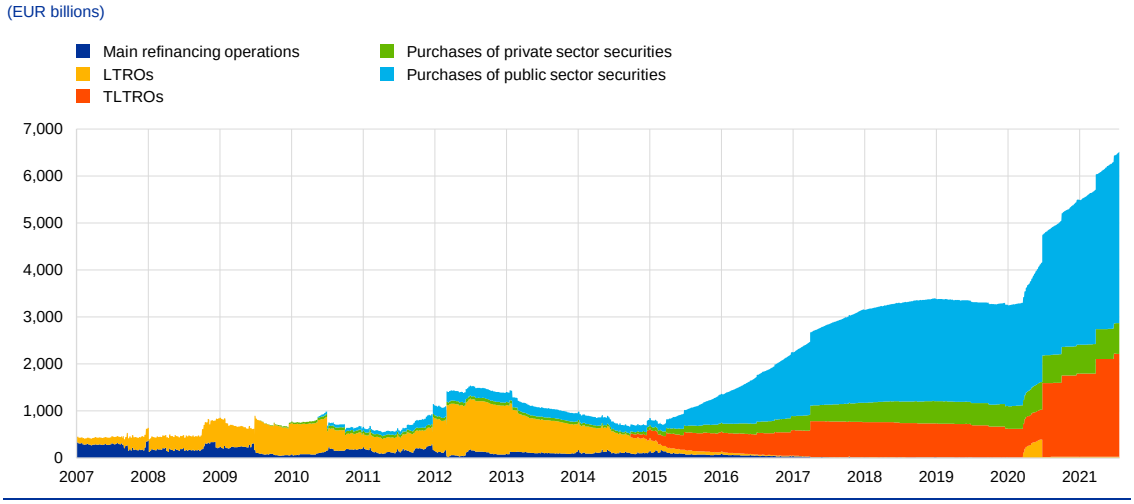
Insights from the Eurosystem balance sheet regarding (the sharing of) financial risks, buffers and net income

Evolution of financial risks and financial buffers within the Eurosystem

Monetary policy-related items on the Eurosystem balance sheet have increased by a factor of more than ten since 2007 (Chart A). The Eurosystem measures and monitors the increased financial risks related to monetary policy exposures on an ongoing basis. The structural changes that have occurred in the national central banks' (NCBs') balance sheets in the last decade have made a significant impact on the composition of financial risks and on the proportion of financial risks shared and not shared among NCBs. These changes have been driven by large-scale unconventional policy measures – and most recently by measures to fight the potential risks to the monetary policy transmission mechanism brought about by the COVID-19 pandemic. As a result of these changes, the composition of the Eurosystem balance sheet has shifted from consisting exclusively of collateralised credit operations to mainly comprising outright securities holdings. The ECB's internal calculations show that their risk contribution is driven by credit risk.[160]

Chart A

Historical evolution of exposures from Eurosystem monetary policy operations



Source: ECB internal calculations.
Note: Only monetary policy assets are shown.

Turning to financial buffers as a key determinant for the Eurosystem's financial risk-bearing capacity, the Eurosystem has, since 2007, built up buffers matching the increase in reported monetary policy-related risks. Box 2 in Chapter 1, entitled "Central bank solvency and mechanisms for safeguarding central bank independence: a brief literature review" explains the importance of financial buffers in order for a central bank to achieve its monetary policy objectives. In fact, the need to ensure the financial strength of NCBs' balance sheets is set out in several Articles of the Protocol on the Statute of the European System of Central Banks and of the

[160] Further details on Eurosystem risk management and financial buffers can be found in European Central Bank (2015).

European Central Bank[161]. In the case of the Eurosystem, financial buffers consist of (i) present accounting buffers, comprising all the current elements of net equity[162]; (ii) additional present economic buffers, including the potential margin of the fair value of assets over the fair value of liabilities; and (iii) government guarantees as well as commitments and risk-sharing arrangements with governments or across NCBs.

Eurosystem net interest income and profits have grown significantly less than the balance sheet itself and the associated financial risks since 2007. The ability of the Eurosystem to generate income and hence preserve an adequate level of central bank financial buffers depends to some extent on the future course of monetary policy and fiscal policy and the interaction between the two. Consequently, this box provides a quantification of the Eurosystem's prospective net income stream under different hypothetical scenarios for the economy and the use of monetary policy instruments.

Balance sheet funding structure and ability to generate net interest income

The changes undergone by the Eurosystem's balance sheet have had a significant impact on the income-generating capacity of the Eurosystem. The asset purchase portfolios and long-term credit operations transfer duration risk from the market onto the Eurosystem's balance sheet. Long-dated assets consisting of TLTROs and bonds purchased outright at low or even negative yields are funded with liabilities in the form of central bank reserves remunerated at the variable deposit facility rate. The resulting asset-liability mismatch generates interest rate risk which increases with the size of the respective asset holdings and their duration.

Net income (NI) projections can provide information about interest rate risk and the financial strength of the Eurosystem under three different monetary policy scenarios, as described and discussed in the main text (see Chart 7). These NI projections are scenarios and not risk projections, in that they only take account of potential changes in interest rates and the potential evolution of the Eurosystem's balance sheet. They do not consider how credit risk or market risk – in the sense of worst-case outcomes – might affect the Eurosystem's net income or net equity.

In both the baseline scenario and the pessimistic scenario, NI is expected to decrease continuously after reaching a peak in the short term (Chart B). Decreasing levels of NI are due to (i) lower interest income from excess liquidity once non-standard lending operations start maturing and (ii) lower interest income earned on the monetary policy portfolios as a consequence of redemptions. Interest rates are not assumed to move to significantly lower levels even in a more pessimistic economic scenario but to remain in negative territory for longer. A pessimistic scenario also assumes lower yields and hence tighter margins earned on the larger asset holdings, together with an extended period during which amounts are exempt from deposit facility remuneration.

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161 Article 7 of the Statute of the ESCB mentions the need for central banks to be independent. Article 3 of Guideline (EU) 2016/2249 of the European Central Bank of 3 November 2016 on the legal framework for accounting and financial reporting in the European System of Central Banks (ECB/2016/34) (the "accounting guideline") sets out the qualitative characteristics that must be reflected in the NCBs' accounting methods and reporting. These include economic reality and transparency, as well as prudence. Article 8 of the accounting guideline provides guidance on how NCBs' might strengthen their balance sheets by establishing a provision for foreign exchange rate, interest rate, credit and gold price risks on their balance sheets.

162 In the case of the ECB, these include capital, general risk provision, revaluation accounts and current income.

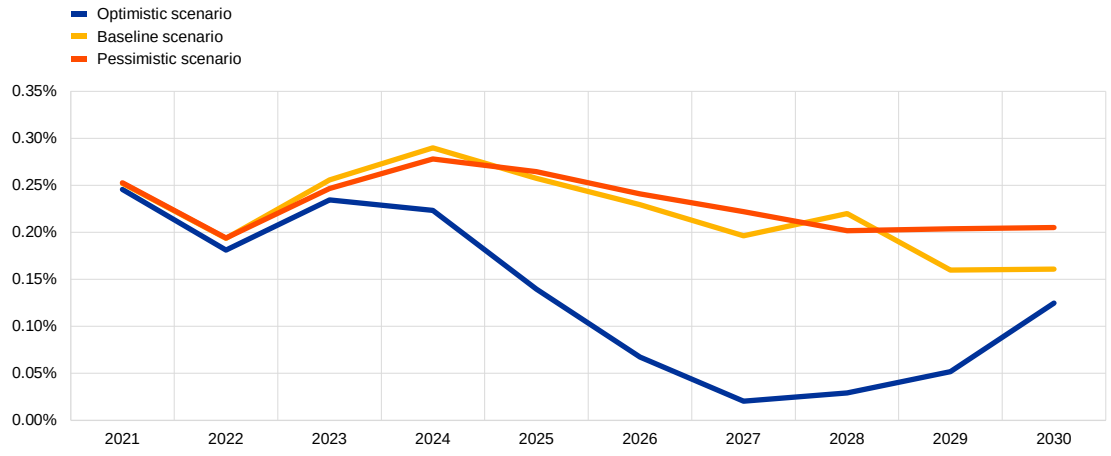
Consequently, the prospective income stream only shows a moderate increase in the pessimistic scenario compared with the baseline scenario.

The strongest impact on the projected evolution of NI is observed in the optimistic scenario reflecting the pronounced interest rate sensitivity of NI. The more rapid increase in policy rates as a consequence of more favourable economic conditions will cause a significant drop in NI in the medium term. While, in this scenario, projected NI at Eurosystem level remains positive throughout the full horizon, results are significantly heterogeneous across NCBs, as for some of them NI turns temporarily into negative territory. This lower – or, for some NCBs, even negative – NI would be a side effect of a successful monetary policy. The NCBs have already built significant financial buffers and may continue to do so, with the result that their net equity is expected to remain significantly positive. NI tends to converge in the very long run when the composition of balance sheets normalises, indicating that income-generating capability can be maintained or restored, either after a period of extended asset purchases or after a period of interest rate hikes.[163]

Chart B

Sensitivity analysis of the net income projections for the Eurosystem

(percentages; projected Eurosystem net income evolution relative to the balance sheet size)



Source: ECB internal calculations.
Note: The scenarios underlying the projected net income are based on the assumptions as explained in Section 3.3.2.1 and in the notes to Chart 7.

Risk-sharing arrangements

References to "risk sharing" in relation to monetary policy operations sometimes confuse the concepts of "loss sharing" and "income sharing". The Statute of the ESCB defines a general income-sharing policy for income accruing in the conduct of monetary policy, while establishing loss indemnification for exceptional cases.[164] Full loss and income sharing may have advantages in terms of policy signalling, consistency in monetary policy implementation and risk mitigation through diversification. The Governing Council has decided on several occasions to share neither the losses nor the full income from monetary policy operations. For example, most monetary policy outright purchases are not subject to loss sharing, while the income is shared at

[163] Under all scenarios, changes to the current monetary policy implementation framework – such as changes to the remuneration of the different Eurosystem liabilities – are conceivable and could positively or negatively influence Eurosystem net income compared with that depicted in Chart B.

[164] See Article 32: "(…) The Governing Council may decide that NCBs shall be indemnified (…) in exceptional circumstances for specific losses arising from monetary policy operations undertaken for the ESCB (…)."

the interest rate applicable to main refinancing operations (MROs).[165],[166] Some general considerations on optimal risk sharing in monetary unions are discussed in Box 2 of this report.

3.3.2.2 Main scenario for the euro area – illustrative simulations

The March 2021 ECB staff macroeconomic projections suggest a recovery of output losses compared with 2019 in 2022 and a closing of the euro area's output gap within the projection horizon. However, despite a pick-up in inflation rates, gaps to the ECB's price stability objective are projected to persist for an extended period. An extrapolation based on survey-based market expectations suggests that inflation rates would only very gradually converge to 2%, thereby implying an undershooting of the ECB's price stability objective for an extended period.

Simulations with the ECB-BASE model indicate that a reference macroeconomic scenario of this kind is consistent with a gradual but slow normalisation of short-term interest rates beyond the medium-term projection horizon when applying a reference pair of monetary and fiscal policy rules. The pair consists of an estimated fiscal policy rule in line with pre-COVID-19 regularities (see Chapter 2) and a monetary policy rule which augments a standard Taylor-type rule for the short-term rate with non-standard measures near the lower bound.[167] For this pair of reference rules, given the projected closing of the output gap and limited pick-up in inflation, the short-term nominal interest rate would edge up slightly in 2023 and then gradually move (somewhat) above the zero lower bound towards the end of the decade. As a result, monetary policy space to combat future economic shocks would remain limited.

While both monetary and fiscal policy support to counter the COVID-19 shock has been substantial (see Section 3.2), the expected persistent undershooting of the ECB's price stability objective raises the question of what the appropriate policy mix might be in the future. In this context, it has been suggested that at times when the ECB is operating close to the ELB, fiscal policy is particularly effective given the monetary policy accommodation. In addition, available fiscal space increases due to favourable interest rate-growth differentials which are expected to remain low for an extended period.

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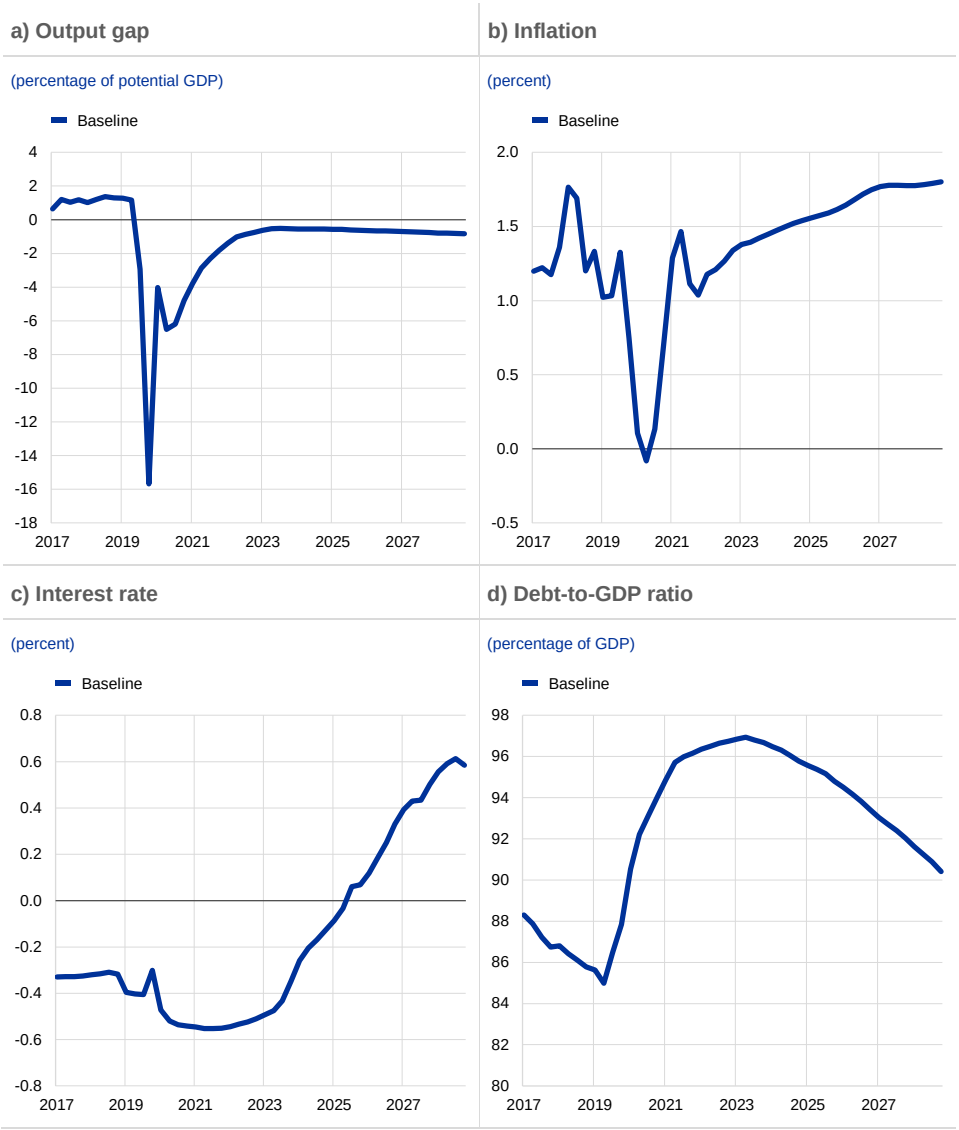
165 Income sharing at the MRO rate results in a treatment that is equal to the treatment of the difference between the values of the assets and liabilities earmarked for monetary income purposes.

166 This applies to assets purchased under the PSPP and the public sector component of PEPP (except in the case of bonds issued by an international organisation or multilateral development bank). Losses incurred by the ECB on its own holdings of PSPP and public sector PEPP assets are shared via reduced profit distributions to the shareholding Eurosystem NCBs. In the case of asset purchase programmes for which the risk/return trade-off seems more relevant, income-sharing rules have mirrored the applied loss-sharing rules. Income related to credit operations is always fully shared, while potential losses arising from the acceptance of certain credit claims and debt instruments as collateral for Eurosystem credit operations are to be borne by the NCB undertaking the operation.

167 For details of the model, Bankowski et al (2021b) and Angelini et al. (2019).

Chart 8
Reference scenario



Source: ECB-BASE simulations.
Note: The potential GDP used for the calculation of the output gap and the debt-to-GDP ratio comes from the European Commission's Spring 2021 Economic Forecast.

The effective absorption of funds from the EU's RRF to promote the quality of public finances and structural reforms at the Member State level will be crucial in order to support a broad-based and sustainable recovery. ECB staff analysis suggests that – if used for productive public investment – NGEU funds could increase euro area real output by around 1.5% of GDP over the medium term.[168]

As regards national fiscal policies, significant challenges with the fiscal framework and its implementation have been identified by the European Commission. The most notable challenge is the frequent fiscal procyclicality in both good and bad economic times, which has hampered the ability of

[168] See Bańkowski et al. (2021a).

policymakers to steer the aggregate fiscal policy stance. At the same time, it has been acknowledged that the appropriate role of fiscal and economic policy in macroeconomic stabilisation needs to be assessed, given that monetary policy is increasingly constrained by the ELB on interest rates.

From a conceptual point of view, an assessment of the appropriate fiscal stance requires a well-specified fiscal policy reaction function which appropriately reflects economic and budgetary conditions. Monetary policy constraints close to the ELB imply that the fiscal policy stance in the euro area is becoming particularly relevant for the macroeconomic policy mix in the euro area. "Traditional" fiscal policy reaction functions typically capture both cyclical and debt sustainability considerations by linking the fiscal response in a given year to the output gap and the debt level. When monetary policy is operating close to the ELB, fiscal policy tends to become more effective, given the strategic complementarity between monetary and fiscal policies in this constellation as discussed above.

In the event of a major recession during which the monetary policymaker may be constrained at the ELB, it is conceivable that fiscal policy might react more forcefully through a stronger countercyclical reaction, which would indirectly lead to inflationary pressure through demand-side channels. A greater countercyclical reaction might result from a stronger reaction to contemporaneous output gaps. Fiscal policy could also be even more supportive in that it could respond not only by addressing past output losses but also by seeking to achieve a swifter recovery of real income losses in an ELB environment. Avoiding economic hysteresis following large recessions could justify a temporary output gap overshoot[169], also bearing in mind the significant measurement uncertainty when assessing cyclical positions in real time. The composition of fiscal policy is important for generating supply-side effects. As mentioned above, NGEU has an important role to play in this context.

From a monetary policy perspective, it may be desirable for fiscal policy to be linked to a nominal anchor, especially in an ELB environment. If the central bank were constrained and persistent inflation shortfalls emerged, such a link would help to anchor inflation expectations, e.g. if budgetary processes were based on nominal assumptions in line with the central bank's price stability objectives. For example, a nominal anchor could imply that governments target a 2% nominal component when setting wages or indexing transfers. Targeting a swift recovery not only of real output losses but also of nominal output losses constitutes a genuine fiscal policy objective, given that higher nominal growth supports the stabilisation of debt via the denominator effect. At the same time, potential adverse effects resulting from the fiscal expansion in the form of increased financing costs due to sustainability concerns would call for a careful conduct of fiscal policies.

In view of these considerations, policy reaction functions both for fiscal and monetary policy may be specified dynamically to make up for previous shortfalls in conditioning variables over a number of years. Importantly, the

[169] Note, however, that there are no hysteresis effects in the ECB-BASE model, and therefore the level of potential output is not affected by the countercyclicality of fiscal and monetary policies.

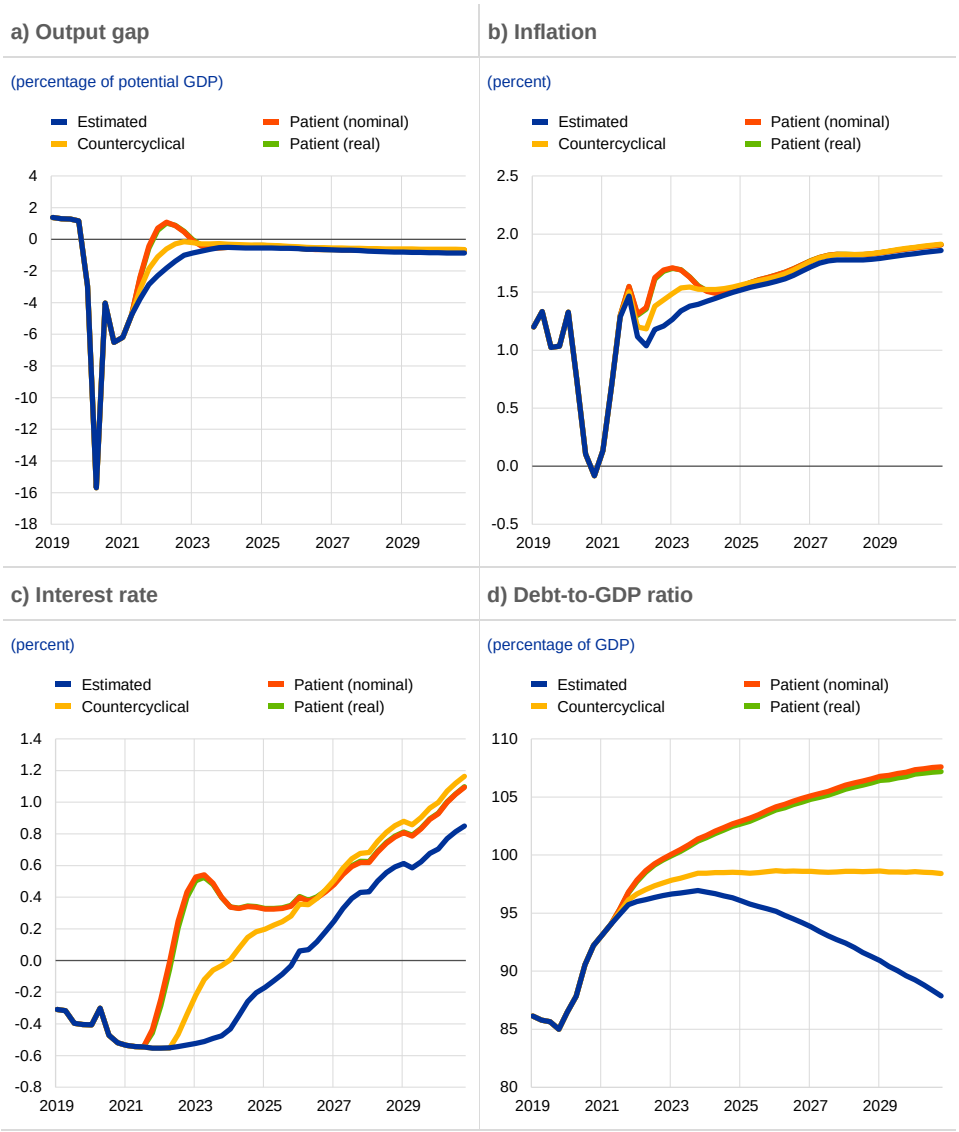
following simulation analysis shows that "patient" fiscal policy rules which include an additional reaction to past output losses, specified in real or nominal terms and activated at the lower bound, can show similar outcomes.

Simulation analysis using the ECB-BASE model illustrates the implications of alternative specifications for the fiscal policy reaction function for macroeconomic trajectories (relative to the reference scenario). Moving from the estimated benchmark fiscal rule to a rule with stronger, inbuilt countercyclicality implies an accelerated closing of the output gap one year ahead of the reference scenario. In addition, a more countercyclical fiscal policy stance lifts the shorter-term inflation trajectory. As a result, the short-term nominal interest rate path steepens, with rates passing the zero lower bound two years ahead of the reference scenario. In the model simulations, stronger expansionary fiscal policies would not significantly alter the longer-term debt dynamics, given that nominal growth effects would largely offset the impact of higher budgetary deficits.

Patient fiscal policy rules targeting the recovery of past output losses imply additional fiscal policy loosening relative to the reference scenario. As can be seen in Chart 9, panels a and b, more patient fiscal policy conduct aiming to make up additionally for past output losses supports a faster transition towards the inflation objective compared with a fiscal rule specification that only shows more strongly countercyclical sensitivity to the output gap, given the related demand effects. The more expansionary fiscal stance implies an opening of the output gap into positive territory, which introduces a trade-off between the macroeconomic stabilisation objective and the inflation objective. The trade-off emerges from the fact that in the reference scenario, the closing of the output and inflation gap are not synchronised, the latter being significantly more persistent. This factor may make more "patient" strategies less attractive from the viewpoint of fiscal policymakers.

Chart 9

Macroeconomic implications of alternative fiscal policy rules (with monetary policy based on an estimated augmented benchmark Taylor rule)



Source: ECB-BASE simulations.
Notes: Counterfactual scenarios compare the estimated pre-COVID-19 behaviour of fiscal policy ("estimated" scenario), with fiscal policy reacting stronger countercyclically to the output gap ("countercyclical" scenario). Nominal output losses are also considered ("patient (nominal)" scenario), along with the cumulated output gap over two years ("patient (real)" scenario). The reaction of fiscal policies in these scenarios is concentrated into three expenditure categories: government purchases, transfers and public investment (see Bankowski et al., 2021b) for details of the exact specification of fiscal policy rules). The potential GDP used for the calculation of the output gap and the debt-to-GDP ratio comes from the European Commission's Spring 2021 Economic Forecast.

Patient fiscal policy rules generate a further scaling-up of fiscal loosening compared with the reference scenario, either by targeting output losses in nominal terms ("patient (nominal)") or by taking into account past output gaps ("patient (real)"). The implied additional fiscal expansion in both cases is, by construction, of a similar order of magnitude and would result in cumulative primary spending increases of some 7 percentage points of GDP up to 2025, which would temporarily push inflation up to around 1.5% in 2023 while also putting government debt on an upward trajectory.

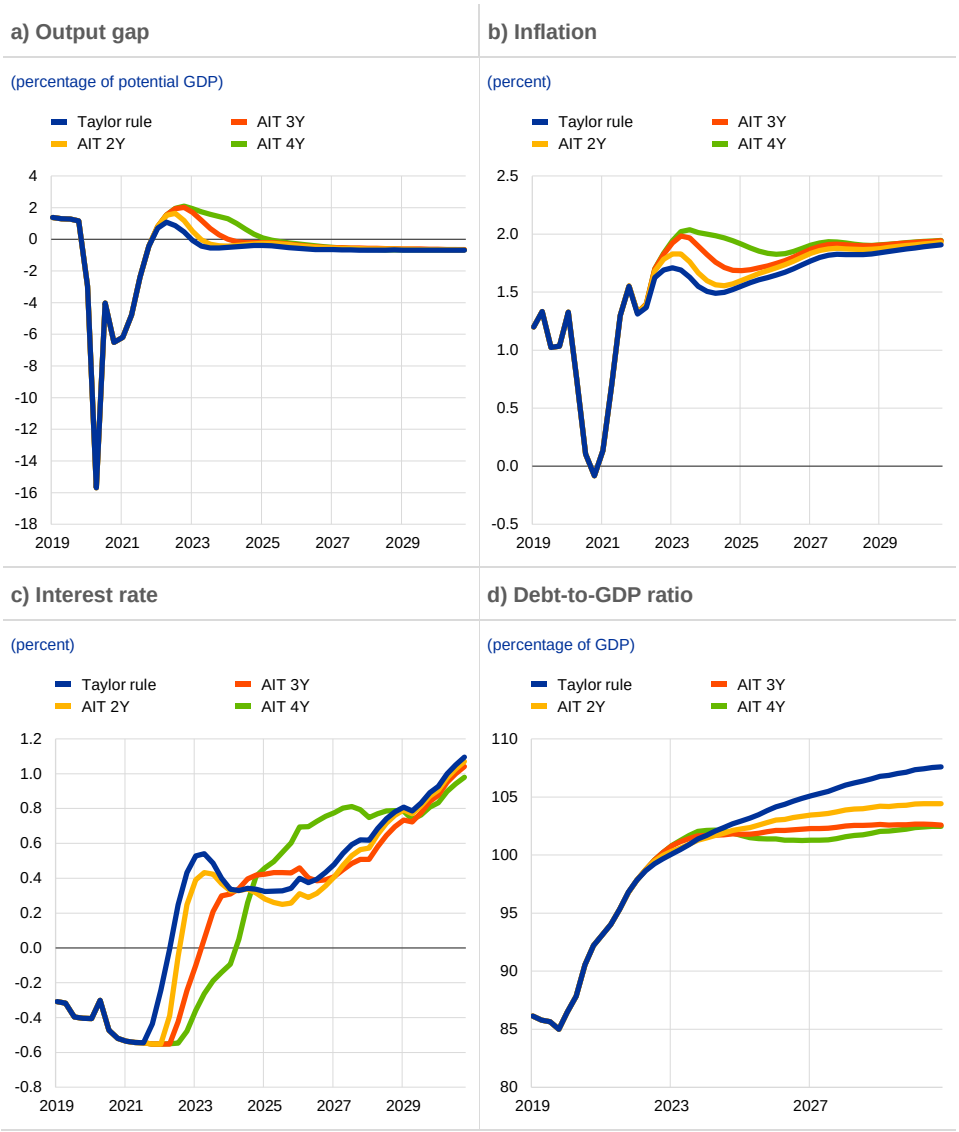
A shift to patient fiscal support (real or nominal) creates room for the monetary policymaker to rebuild policy space, implying an earlier lift-off from the lower bound (compared with the reference scenario). As can be seen from Chart 9, panel c, the endogenous monetary policy response based on the estimated monetary policy rule results in an accelerated normalisation of the short-term interest rate when the fiscal response becomes more patient. The short-term interest rate would move into positive territory within one year. According to the model simulations, none of the fiscal policy rule specifications would imply the achievement of the inflation objective when monetary policy follows the augmented benchmark Taylor rule, highlighting the complementarity of fiscal and monetary policy in the current environment.

The ECB-BASE simulations indicate that a degree of fiscal support required to recover output losses more swiftly (and as a result of this helping to close the inflation gap) would probably not be compatible with a return to country-specific surveillance under the SGP framework in 2023. The most expansionary fiscal scenario would imply an increase in the aggregate budget deficit to around 7% of GDP in 2021/22 and a gradual but slow decline thereafter. As a result, government debt would remain on an upward-sloping path for an extended period, owing in part to the increase in sovereign financing costs related to the central bank's interest rate increase. Additional expansion of this kind would therefore need to come either from countries with available fiscal space or from a European-level budgetary instrument.

According to these simulations, a faster (and prolonged) attainment of the inflation objective could only be achieved through a patient monetary policy rule (with make-up features) which enhances the effectiveness of fiscal policy support by reducing debt dynamics. Qualitatively, this result holds true for any of the fiscal rules under consideration. However, the effects are most pronounced when a patient monetary policy rule (i.e. a rule with make-up features) receives support from a patient fiscal rule. The reference monetary policy rule, when also allowing for make-up features, would slow down the normalisation of interest rates compared with the response under the reference rule (thus, interest rates would be low for longer). As a result, lower debt financing costs would to some extent offset the impact of primary deficits on the accumulation of public debt, implying an earlier stabilisation of the debt ratio and return to a declining path. Combining an "expansionary for longer" fiscal rule and a more patient monetary policy rule therefore implies a mutual creation of policy space. On the one hand, lower interest rates related to the monetary make-up moderate debt dynamics. On the other hand, the swifter convergence towards the inflation objective allows the monetary policymaker to raise interest rates more rapidly than in the reference scenario.

Chart 10

Interaction of "patient" monetary and fiscal inflation policy rules (fiscal policy based on the "patient (nominal)" rule)



Source: ECB simulations based on the ECB-BASE model.
Notes: Counterfactual scenarios compare the exogenous reference path of monetary policy with an interest rate rule following the augmented Taylor rule (the "Taylor rule" scenario); they also show how the exogenous reference path reacts to the cumulated inflation gap over two, three and four years (the "AIT2Y", "AIT3Y", and "AIT4Y" scenarios).The potential GDP used for the calculation of the output gap and the debt-to-GDP ratio comes from the European Commission's Spring 2021 Economic Forecast. AIT stands for average-inflation targeting.

To put the range of findings obtained with the ECB-BASE model into perspective, it is important to recall that the relative effectiveness of key ingredients of monetary versus fiscal policy rules depends on how expectations are formed, with the two sets of rules typically operating in opposite directions in this regard. In the estimated ECB-BASE model, backward-looking expectations prevail. Under this specification, fiscal policy has a particularly powerful impact in reducing output and inflation gaps, since the future implications of the intertemporal budget constraint are not fully internalised by consumers and firms. This impact of fiscal policy weakens as the degree to which expectations are

forward-looking increases, particularly if the central bank does not keep short and long interest rates at low levels.[170] By contrast, the impact of make-up elements, as typically discussed in monetary policy rules, increases in line with the degree to which expectations are forward-looking, as the potency of make-up elements depends on the anticipation that current shortfalls in inflation will be compensated for by an inflation overshoot in the future. The effectiveness of this forward-looking channel depends on the homogeneity of expectations held within the private sector. In particular, the impact of this channel on output and inflation may be less pronounced when expectations of households are less forward-looking than those of financial market participants. For example, if financial markets are the only segment of the economy repricing higher longer-term inflation expectations into borrowing rates, firms and households may perceive a tightening of financing conditions in such a situation, which will in turn have an adverse effect on their expenditure decisions and so prevent price pressures from building up.[171]

For a detailed discussion of transmission channels under backward-looking versus forward-looking expectations, see Box 16 below.

Box 16

Fiscal multipliers, interest rate rules and expectations formation

In recent years, monetary policymakers have faced significant challenges, including a secular decline in the equilibrium real interest rate combined with low inflation pressures that have kept nominal interest rates low and sometimes at their ELB. Model-based analysis suggests that the cost of the ELB is quite substantial.[172] In a recessionary environment, if the nominal interest rate is constrained by the ELB, the real interest rate will increase compared with a scenario in which it is unconstrained, and both inflation and output will decrease further. Increased incidence of the ELB translates into worsened macroeconomic outcomes – on average, inflation will be well below target and the output gap will be negative, while both variables will be more volatile. This box explores (i) which monetary policy strategies might help to mitigate this negative spiral and (ii) how those strategies might affect the transmission of exogenous fiscal shocks. It should be emphasised that the box abstracts from the impact of different fiscal rules that might also incorporate history-dependant elements.

Among the different strategies for overcoming the negative impact of the ELB, make-up interest rate rules such as average-inflation targeting (AIT) and price-level targeting (PLT) have been extensively analysed. Under AIT or PLT, the central bank tries to compensate for past episodes of too low inflation by aiming for future inflation above the central bank's long-run inflation target. If agents are forward-looking and understand the make-up interest rate rule (i.e. under rational expectations), they expect a lower real interest rate in the future, thus pushing up demand and improving current

[170] In fully forward-looking, rational expectation models with a single representative agent, fiscal policy measures tend to have little impact in anticipation of future tax burdens. In heterogeneous agent models, as discussed in Chapter 1, redistributive policies and social insurance support aggregate demand, inflation and the natural rate of interest, even with forward-looking rational expectations. If higher inflation were to redistribute financial wealth in favour of more constrained debtors with nominal liabilities (including most taxpayers), the demand effects of expansionary fiscal policies would even be stronger.

[171] For a discussion of recent findings on the formation of expectations, see Coibion et al. (2020).

[172] One example from the literature focusing on the euro area is Coenen, Montes-Galdón and Smets (2020).

stabilisation outcomes. However, the assumption of rational expectations based on full information is too stringent and has been rejected when analysing survey expectations, or when dynamic stochastic general equilibrium models (DSGEs) are estimated under different expectations formation mechanisms.

To explain the interaction between alternative expectations formation mechanisms and make-up interest rate rules, Chart A shows a scenario in which an adverse demand shock materialises in the first quarter of 2020, taking as the baseline the medium-term reference scenario in the December 2019 projection. The impact on annual inflation is analysed both on the assumption of rational expectations and under a "hybrid expectations" scheme:

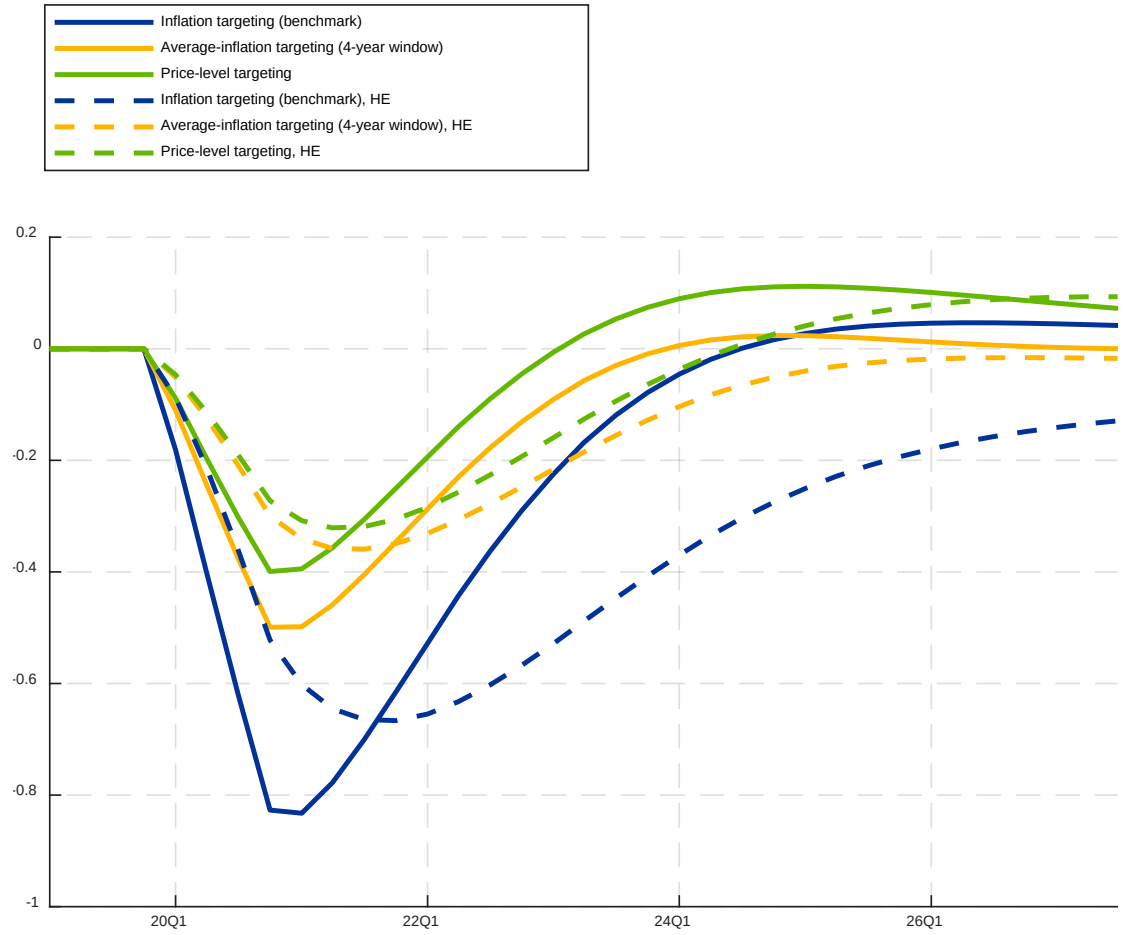
$$\tilde{E}_t X_{t+1} = \alpha E_t^{RE} X_{t+1} + (1-\alpha) E_t^{AE} X_{t+1}$$

$$E_t^{AE} X_{t+1} = \theta E_{t-1}^{AE} X_t + (1-\theta) X_t$$

Thus, expectations in the model are a weighted average between rational expectations (E^{RE}) and adaptive expectations (E^{AE}). Adaptive expectations feature a backward-looking component and a learning component in which agents update their beliefs according to the realisation of the interest variable. Under inflation targeting (IT), there is a greater decrease in inflation, both under rational and hybrid expectations. However, under hybrid expectations the response of inflation is more persistent, so the recovery takes longer, and inflation is still subdued by the end of the projection horizon. Both AIT and PLT can significantly mitigate the impact of the adverse shock, including under hybrid expectations.

Chart A

Response of annual inflation to an adverse demand shock around the December 2019 Eurosystem staff macroeconomic projections extended baseline



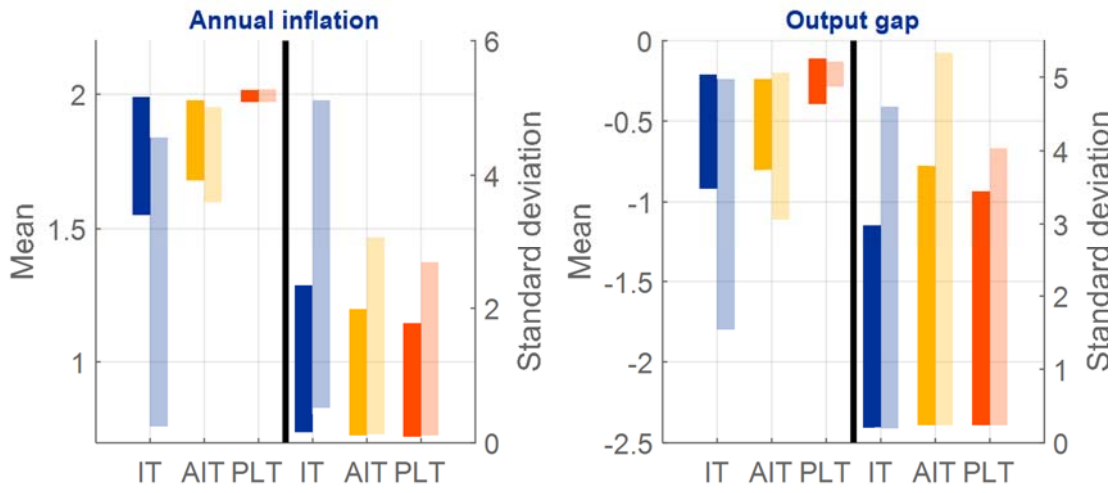
Source: ECB staff calculations based on the New Area-Wide Model (NAWM).
Notes: The chart shows the marginal impact on annual inflation of a negative demand shock around the December 2019 Eurosystem staff macroeconomic projections extended baseline (medium-term reference scenario). The model is simulated under rational and hybrid expectations (HE) assumes that the ELB is set at -0.5%.

Meanwhile, Chart B summarises the key results from a harmonised exercise across different models used in the ESCB to compare the stabilisation properties of the different make-up interest rate rules under a combination of demand and supply shocks. The models are simulated for many periods accounting for the ELB. The long-run average and the standard deviation of inflation and the output gap across the simulation are then calculated.

The results suggest that, as before, under an IT interest rate rule, hybrid expectations pose a significantly bigger challenge to monetary policy stabilisation than rational expectations (blue bars). The simulations show that both the frequency of ELB episodes and their duration increase, and this is translated mainly into a shortfall in average inflation in the simulations with respect to the target value, as well as a larger standard deviation. The main reason is that, under more backward-looking expectations, nominal variables become more persistent and volatile. The larger volatility and persistence of inflation implies that when the economy enters an ELB episode, it takes more time for inflation to recover, which delays the lift-off date of the nominal rate. The real interest rate increases, thus amplifying the negative impact of the constraint via demand shortfalls.

Chart B

Comparison of the stabilisation properties of different strategies under rational (solid bars) or hybrid expectations (lighter-shaded bars)



Source: ECB and NCB staff calculations, based on the Working Group on Econometric Modelling (WGEM) Expert Group on Expectations Formation and Monetary Policy.
Notes: This chart depicts bars representing the means and the standard deviations for the steady-state simulations of annual inflation and the output gap that are obtained by carrying out stochastic simulations around the models' non-stochastic steady state, allowing for both demand shocks and supply shocks. The simulations were conducted taking the ELB into account. Each bar represents the range of results from the different models that were used for the simulations, both under model-consistent expectations (solid bars) and under hybrid expectations (lighter-shaded bars). The simulations were conducted under different interest rate rules. Inflation targeting (IT) is the benchmark used for comparing the alternative make-up strategies, namely average-inflation targeting (AIT) and price-level targeting (PLT) with a four-year window. The long-run equilibrium real interest rate is set to r^*=0.5%, and the inflation target is π^*=2%.

However, even under hybrid expectations (lighter-shaded bars), make-up strategies can still be very effective in undoing the negative effects of the ELB constraint. While the volatility of annual inflation and the output gap increases under the three different interest rate rules compared with the scenario of rational expectations, AIT and PLT rules can significantly decrease the negative bias in the mean of both variables. Therefore, when there is a risk of expectations becoming more backward-looking (which could be the case during ELB episodes in which central banks might find it difficult to achieve their price stability objective), interest rate rules that incorporate history dependence are still preferred to inflation targeting rules. Additionally, a PLT rule would also decrease the frequency and duration of ELB episodes. In general equilibrium, ELB episodes will happen less often, as agents expect better inflation and output outcomes. It should also be noted that similar outcomes are found when expectations follow a pure adaptive learning scheme.

Interest rate rules that incorporate make-up elements, while being the most stabilising in terms of output and inflation, may also have an impact on the transmission of fiscal policy. The response of the interest rate to a fiscal shock will affect the cost of servicing the possible debt generated by the shock, as will the response of other macroeconomic variables. Chart C shows the different DSGE model-based fiscal multipliers under different monetary policy strategies. In the baseline scenarios, it is assumed that there is an exogenous expansion or reduction of government spending which amounts to 1% of real GDP over two years, and that the interest rate rule is active, no matter whether the central bank follows a PLT, AIT or IT strategy. In the baseline case, the different models predict that the fiscal multiplier would be smaller than 1 in all cases, and there is not much heterogeneity across the different monetary policy strategies. This is no longer the case when monetary policy is more accommodative or constrained by the ELB.

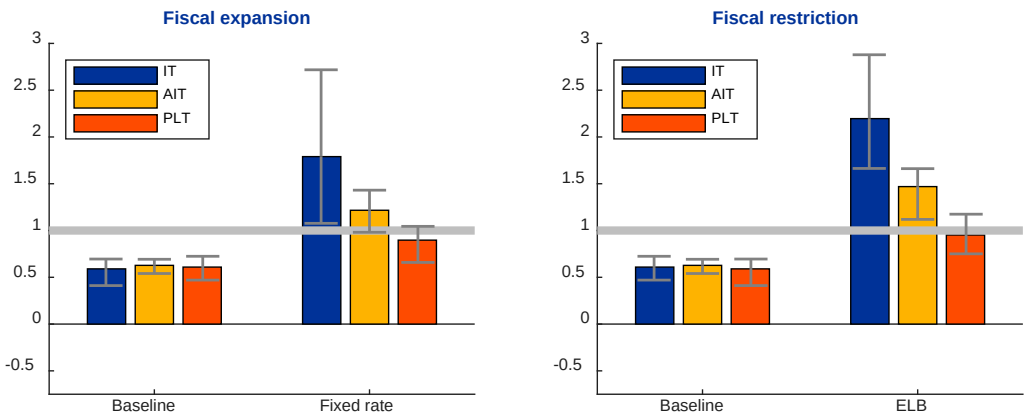
In the case of an exogenous fiscal expansion (left panel), if the central bank makes a commitment to fix the short-term nominal interest rate during the two years of the fiscal intervention, the multipliers increase as expected, owing to the additional monetary policy accommodation. However, there are more pronounced differences among the different interest rate policy rules. Make-up strategies diminish the effectiveness of government spending shocks. The main reason is that a policy such as PLT acts as an automatic stabiliser for inflation, both for deflationary and inflationary shocks. If the fiscal shocks generate inflation, the central bank will need to tolerate inflation below target in the future to stabilise the price level. Agents will predict higher real interest rates in the future, and the response of current real GDP will be less expansive, thereby reducing the fiscal multiplier.

If a temporary fiscal restriction brings the nominal interest rate to the ELB, the size of the multiplier will also increase, and consequently, the impact on real GDP will be more negative. In this case, make-up strategies will help to stabilise the shortfalls in inflation and real GDP, making the reduction in spending less costly (so that the fiscal multiplier will be smaller under PLT). The simulation in Chart C is illustrative, as simulations at the ELB are non-linear. If the fiscal restriction occurred in a period in which demand was already subdued and the nominal interest rate was already constrained, the multiplier would be larger, amplifying the negative impact on real GDP. In this case, make-up strategies would still be preferred and would be more stabilising in relative terms.

Therefore, while make-up strategies are effective at stabilising macroeconomic variables, there is a trade-off with the effectiveness of fiscal policy to be taken into consideration. This result is robust across different classes of models (DSGE and semi-structural) and for different types of expectations formation mechanism.

Chart C

Model-based fiscal multipliers of an expansionary (left panel) and a contractionary (right panel) fiscal shock



Source: ECB and NCB staff calculations, based on the WGEM Expert Group on Expectations Formation and Monetary Policy.
Notes: Each bar represents the median size of the fiscal multiplier across different models in the first year after a government spending shock, under different monetary policy strategies. Baseline cases assume that the interest rate rule is always active. In the fiscal expansion case, the "fixed rate" assumption implies that the nominal interest rate will be kept fixed during two years before the policy rule is activated. In the fiscal restriction case, it is assumed that the negative government spending shock will bring the economy to the ELB so that monetary policy is constrained.

3.3.2.3 Risks to the main scenario (euro area dimension) – illustrative simulations

3.3.2.4 Part 1: Stochastic simulations from the ECB-BASE model

The extension of the baseline until 2030 underlying the main scenario discussed above is based on various assumptions that are subject to considerable uncertainties. Stochastic simulations can help assess the extent of such uncertainties.[173] While the deterministic simulations allow for a ranking of different policy mixes against the actual realisations of the baseline, stochastic simulations can give additional insights. For example, these simulations can show how the different rule combinations would perform if the economy was subject to sequences of positive or negative shocks leading to tail events. More specifically, the stochastic simulations are constructed by bootstrapping from residuals of the historical period between 2003 and the beginning of the COVID-19 pandemic (fourth quarter of 2019).[174] The shaded areas in Chart 11 correspond to the 95% confidence bands between the 2.5th and the 97.5th percentile computed around the baseline. The means of the stochastic distributions under the counterfactual policy experiments show a picture consistent with the counterfactual scenarios discussed in Chapter 2.[175]

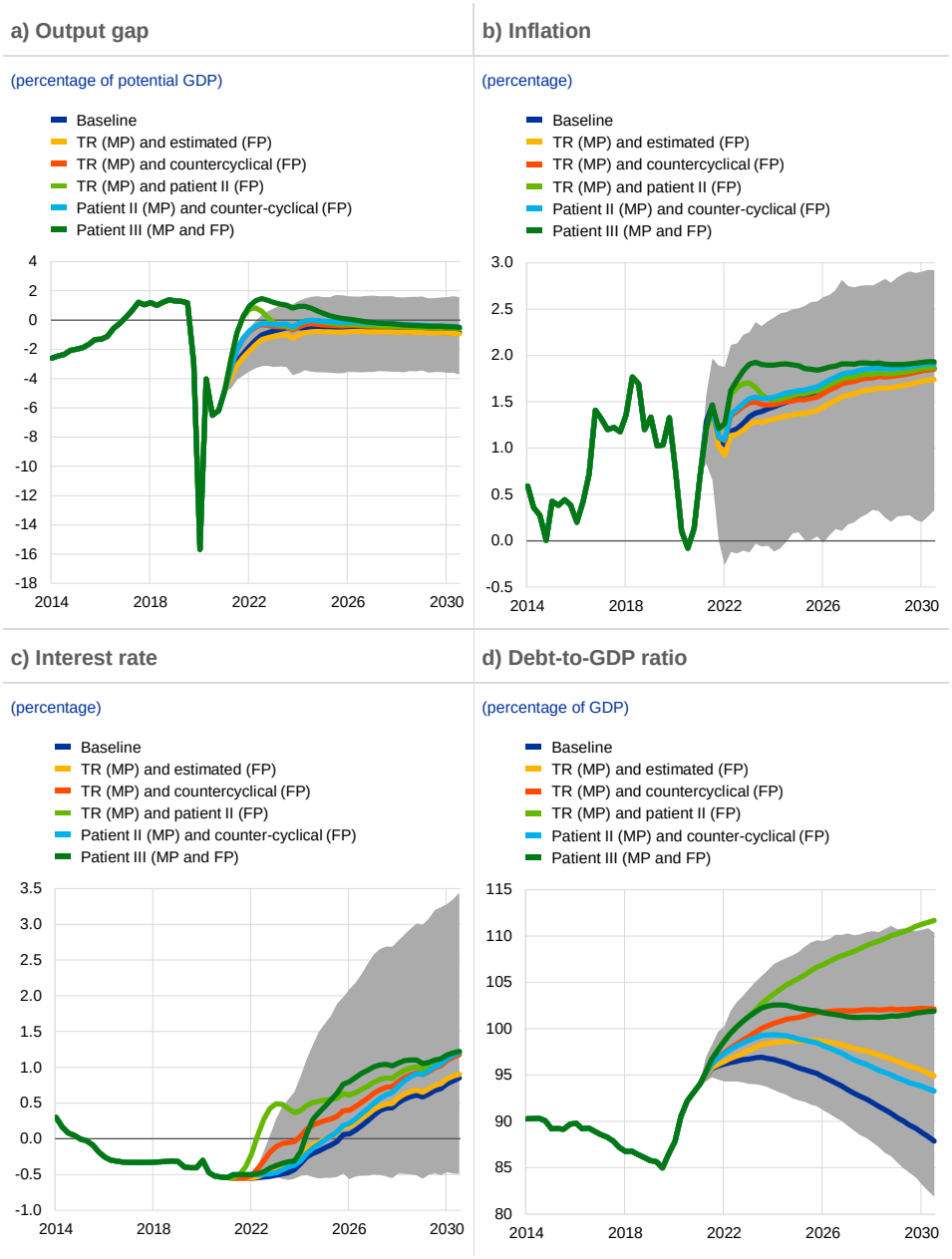
[173] The stochastic simulations not only make it possible to assess the uncertainties around the baseline but also illustrate the impact of uncertainty on the baseline itself as well as on the counterfactual simulations around the baseline.

[174] The residuals observed during 2020 and 20201 are very large and could therefore significantly skew the outlook to the downside. The bands displayed in Chart 14 are based on 2000 path simulations of the model under the baseline specification and under the variant rules.

[175] Small discrepancies between the results of the stochastic and deterministic simulations are caused by the fact that the ELB implies a negative bias on the means of output and inflation.

Chart 11

Stochastic forward-looking simulations: baseline with variants



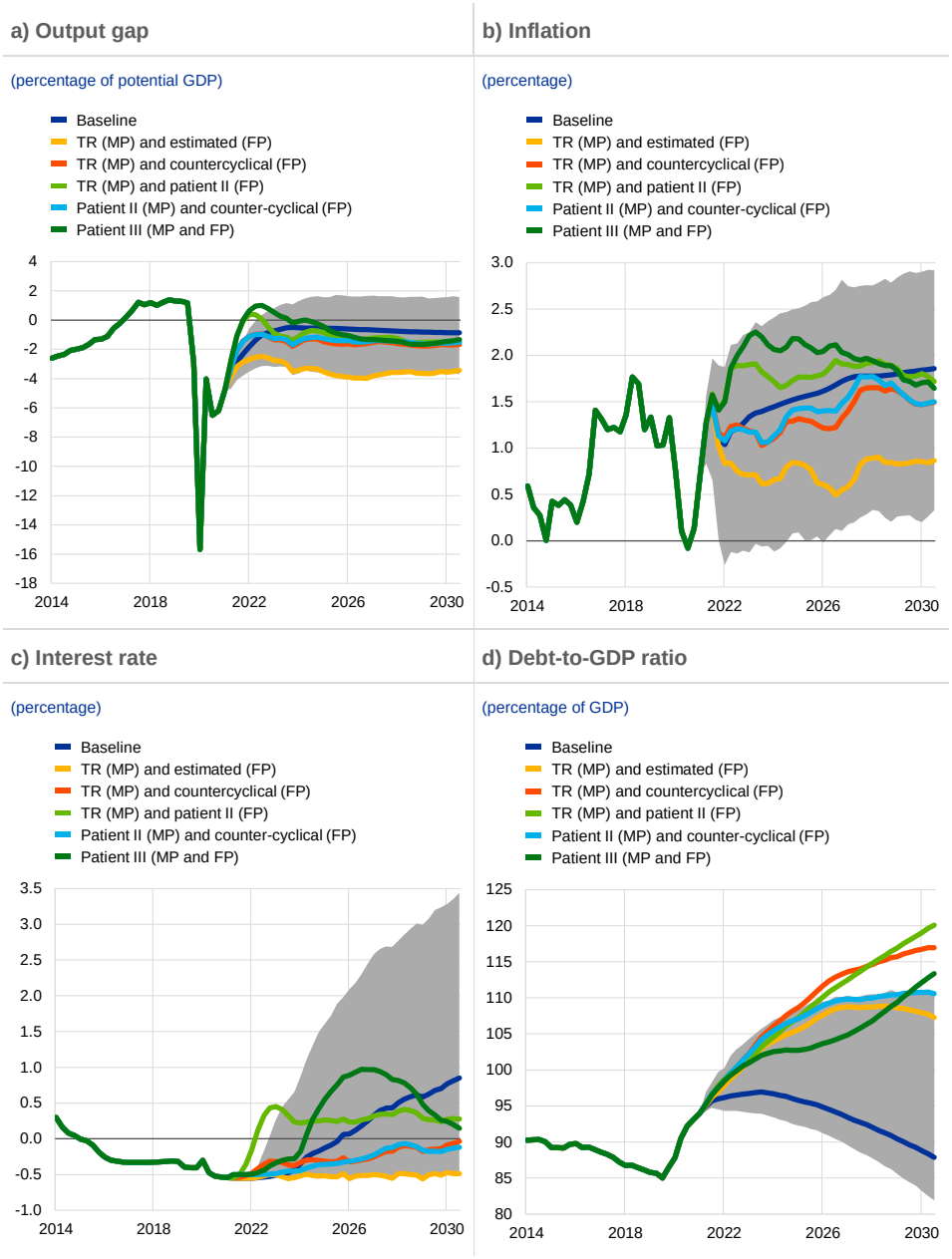
Source: ECB simulations based on the ECB-BASE model.
Notes: The shaded area depicts the 95% confidence interval, based on 1000 simulation paths using bootstrapped residuals centered around the baseline. The lines represent the means of those simulations for the baseline specification as well as for the variant simulations. TR stands for augmented Taylor rule, MP stands for monetary policy, and FP stands for fiscal policy.

To illustrate the risks around the baseline, tail events are considered, showing that the fiscal-monetary policy mix can stabilise the economy given either negative tail events (without bringing inflation back to its objective) or positive tail events (with inflation reverting back to its objective from above). To construct the tail events, the 40 paths with the most negative realisations of output and the 40 paths with the most positive realisations of output are selected; the corresponding means of the realisations for the variables both in the baseline and in the counterfactual policy simulations are depicted in Charts 12 and 13 respectively.

The negative scenario shows that fiscal stabilisation policies stay effective in the lower tails of the distribution, while monetary policy is constrained by the ELB and can only contribute via non-standard measures. This implies that stabilisation remains incomplete and inflation stays significantly below the target, even for the more aggressive fiscal rules. The positive scenario shows that the stabilisation rules switch their sign and bring the output gap and inflation to their targets from above. Under the positive scenario, the debt-to-GDP ratio stabilises rapidly under all combinations of policy rules, while under the negative scenario the debt-to-GDP ratio increases to levels up to 120%.

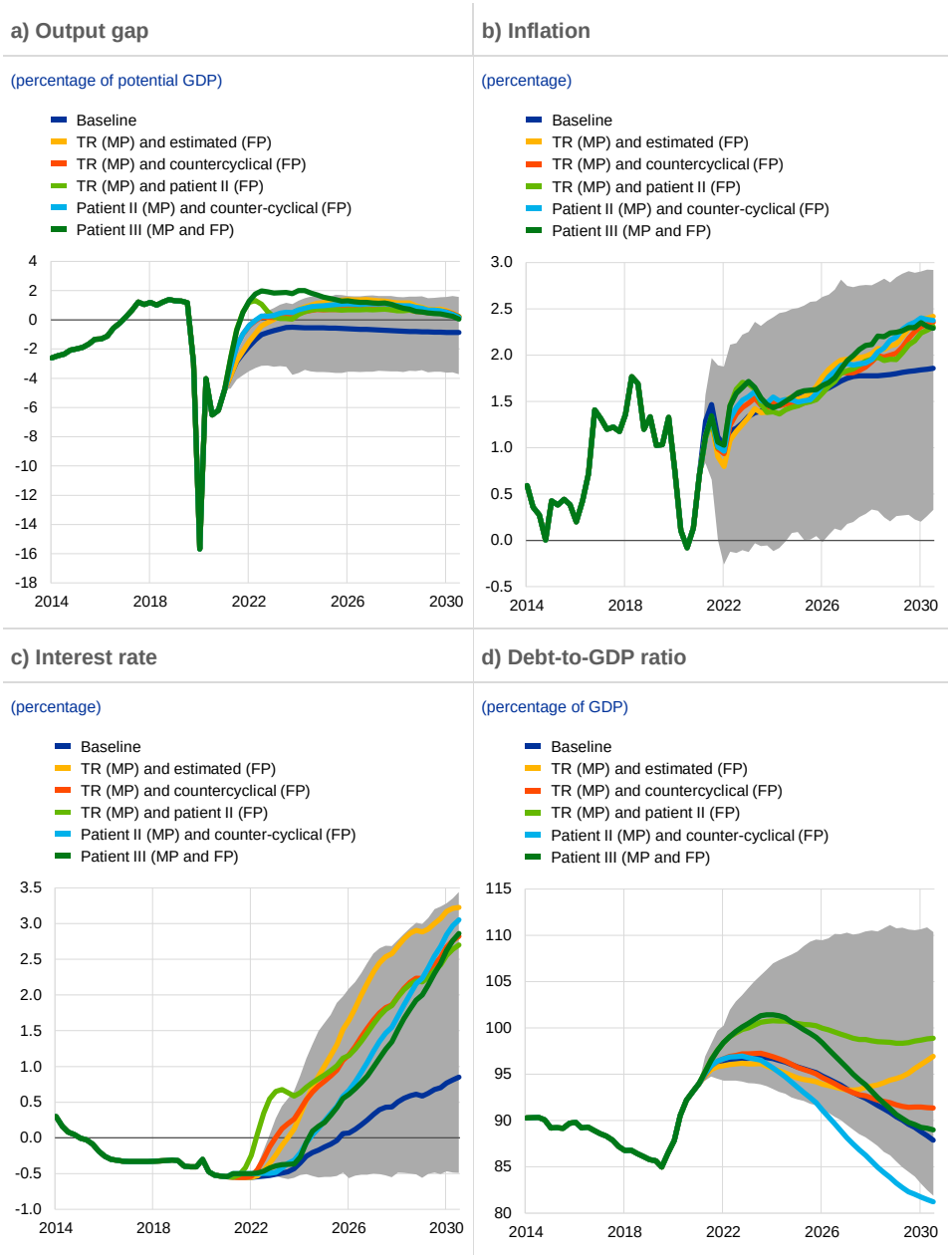
Chart 12

Pessimistic scenario



Source: ECB simulations based on the ECB-BASE model.
Notes: The pessimistic scenario is constructed by choosing the 40 most negative path realisations of output in the baseline and depicting the means of these paths and the respective paths of the other variables. TR stands for augmented Taylor rule, MP stands for monetary policy, and FP stands for fiscal policy.

Chart 13
Optimistic scenario



Source: ECB simulations based on the ECB-BASE model.
Notes: The optimistic scenario is constructed by choosing the 40 most positive path realisations of output in the baseline and depicting the means of these paths and the respective paths of the other variables. TR stands for augmented Taylor rule, MP stands for monetary policy, and FP stands for fiscal policy.

Part 2: Euro area risk considerations outside the ECB-BASE model

To address aspects of government debt sustainability and possible concerns about fiscal dominance, a different modelling approach is required, as the version of the ECB-BASE model employed here has a clear focus on the stabilisation dimension, abstracting, by assumption, from sustainability concerns

associated with high and possibly rising government debt levels. However, such debt dynamics, if left unchecked by the fiscal framework, could create pressure on the central bank at the political level to give up on its price stability objective. This could, at the extreme, lead to the regime traditionally referred to as fiscal dominance in the theoretical literature on monetary-fiscal interactions.[176] As a key feature of this regime, seigniorage income would be actively generated via higher inflation to prevent governments from defaulting on privately held debt.

Empirically, it is less clear how one could identify such a (permanent) regime shift. Box 17 looks into this question and concludes that markets currently do not see risks of fiscal dominance in the euro area, as perceptions of a rising fiscal burden are generally not associated with significantly higher long-term inflation expectations. If anything, it is found that greater public debt sustainability concerns in some countries are associated with falling long-term inflation expectations, which might reflect the impact of future fiscal consolidations needed to ensure fiscal solvency.

For the years ahead, the ESCB's debt sustainability analysis tool can be used to discuss various scenarios for euro area government dynamics, as shown in Box 18. As regards results for the euro area as whole, a key finding is that for the next decade a trajectory of rising and not stabilising euro area government debt can only be observed in a scenario in which inflation remains below the ECB's aim well beyond the medium term and fiscal policy shows no consolidation. By contrast, a rapid return of inflation to higher levels helps to stabilise debt dynamics. As a caveat, over such long horizons, the Lucas critique calls for a cautious interpretation of the findings, as incentives for government behaviour may change over time.

While the price stability mandate of the ECB is well protected, high and rising debt levels can cause financial stability risks, raising concerns about financial dominance. The Treaty provides for important safeguards that protect the price stability mandate of the ECB from fiscal dominance scenarios (see Box 5). However, high and rising debt levels – especially when inflation surprises on the downside for an extended period of time, and this is combined with low nominal growth – may in principle increase the likelihood of a future financial dominance situation. Although financial sector regulation and macroprudential policy tools are the first line of defence against the build-up of financial imbalances, this cannot fully exclude the possibility that the central bank might face a difficult trade-off between compromising on its inflation objective and being seen as causing financial instability that is triggered by fears of a default or concerns about a further intensification of the sovereign-bank nexus (see Box 8). Unless addressed by effective measures which mitigate this nexus (see Section 3.3.3 below), this constellation could complicate the exit from expansionary policies, both on the monetary side and on the fiscal side, and may also increase debt overhangs.

[176] See Sargent and Wallace (1981) and literature discussed in Chapter 1.

As argued in Section 1.3.3 above, which deals with conceptual aspects of monetary-fiscal policy interactions, there are other relevant factors to consider if we allow for sustainability concerns at country level, as discussed in the next section.

Box 17

Do markets see risks of fiscal dominance in the euro area?

Both in the sovereign debt crisis of 2010-12 and in the recent COVID-19 pandemic, we have witnessed a combination of a strong monetary response and a sharp increase in sovereign debt.[177] This policy mix could in principle raise concerns over the possibility of embarking on a fiscal dominance regime in the future. Under such a regime, the central bank would forgo its price stability objective and use monetary policy to ensure public debt sustainability (Sargent and Wallace, 1981). A shift towards a regime of fiscal dominance could lead to higher and de-anchored inflation expectations if agents were to observe a deterioration in public finances, which could threaten long-run price and economic stability.

In this box, we estimate the impact of changes in financial markets' perception of fiscal burden on long-term inflation expectations in the euro area, both during the sovereign debt crisis and during the pandemic crisis. According to theory, an increase in market participants' perceptions of fiscal burden should, in a regime of fiscal dominance, raise long-term inflation expectations. At the same time, long-term inflation expectations should not respond to fiscal fundamentals under a regime of monetary dominance, in which the central bank pursues price stability. Therefore, our empirical exercise helps capture financial market expectations as to which policy regime will prevail.

Empirical strategy

We measure market participants' long-term inflation expectations using five-year, five-year forward inflation swaps. Perceptions of a country's fiscal burden are measured by the first common factors of various indicators of sovereign risk, such as sovereign credit default swap (CDS) spreads and spreads between yields at different maturities. In selecting these indicators, we follow the empirical literature (e.g. IMF, 2009; Altavilla et al., 2016; Amstad et al., 2016) and analysis by the IMF (2012) on risks to fiscal sustainability during the sovereign debt crisis. We obtain these factors for the four largest euro area countries (i.e. Germany, France, Italy and Spain). To account for other important drivers of inflation expectations, we include a set of macroeconomic news (i.e. the difference between the announced and expected values) for various macroeconomic variables typically used in the literature, such as inflation and unemployment, on the day of the announcement. We also include the implied volatility of bond yields (or that of equity prices) to control for market dynamics unrelated to expectations, such as changes in liquidity conditions. We perform the exercise for two crisis periods: the sovereign debt crisis (2010-2012) and the COVID-19 pandemic (starting from 2020). Note that our empirical strategy allows us to focus on the statistical significance and the sign of the coefficients on our indicator of perceived fiscal burden, but not on their magnitude.

[177] See, for example, Hartmann and Smets (2018).

Table A

Perceptions of fiscal burden and long-term inflation expectations

Explanatory variables	Sovereign debt crisis (2010-2012)	COVID-19 pandemic (2020-present)
Fiscal burden, Spain	-0.022* (0.01)	-0. 12** (0.05)
Fiscal burden, Italy	-0.022* (0.01)	-0. 070** (0.03)
Fiscal burden, France	0.00 (0.02)	0.090 (0.06)
Fiscal burden, Germany	0.05*** (0.01)	0.00 (0.03)
Observations	782	308

Source: Bonam et al. (2021b).
Notes: The table reports results for the regression of daily changes in five-year, five-year forward inflation swaps on the first common factors of various indicators of sovereign risk for Spain, Italy, France and Germany. To preserve space, the coefficient estimates of the control variables (macroeconomic news variables, the Euro-Bund future implied volatility and Stoxx Europe 600 indices) are omitted. Standard errors are in parentheses. *, ** and *** indicate significance levels at 90%, 95% and 99% respectively.

Estimation results

Overall, the surge in public debt levels and highly accommodative monetary policy during the sovereign debt and pandemic crises did not result in market participants becoming concerned about the risk of entering a regime of fiscal dominance. The estimation results, reported in Table A, suggest that perceptions of a rising fiscal burden are generally not associated with significantly higher long-term inflation expectations, either during the sovereign debt crisis or during the pandemic crisis. If anything, higher public debt sustainability concerns in Spain and Italy are associated with falling long-term inflation expectations, which might reflect the impact of future fiscal consolidations needed to ensure fiscal solvency. While the coefficient on the fiscal burden variable for Germany is positive and statistically significant for the first sub-sample, this is unlikely to capture risks of fiscal dominance. From an economic point of view, Germany did not face severe debt sustainability issues during that time. From a statistical point of view, our factor analysis reveals a weaker link between the underlying variables – in particular CDS spreads – and the first common factor for Germany. This suggests that this factor may capture sovereign risk concerns less accurately in Germany than in the other countries.

Box 18

Implications of a potential increase in the interest rate-growth differential for government debt dynamics: euro area-wide and country-specific aspects

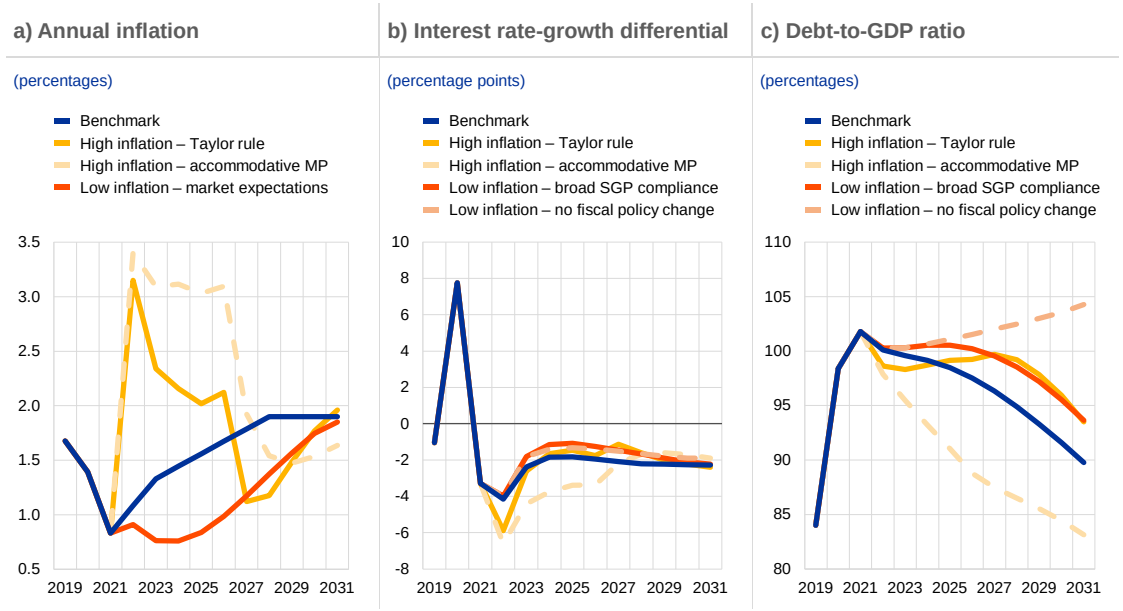
The expectation of persistently negative interest rate-growth differentials is currently alleviating fiscal sustainability concerns, including those related to the sharp rise in government debt induced by the COVID-19 pandemic. However, negative interest rate-growth differentials alone do not ensure debt sustainability[178], and it is uncertain whether they will persist over time. Regarding the latter issue, empirical evidence and economic theory suggest that a reversal in the differential cannot be ruled out, particularly for high-debt countries (see Chapter 2, Box 11). One possible narrative for such a reversal, which is particularly relevant for monetary policy, is related to a shift in inflation expectations. We show two indicative scenarios of an inflation-driven increase in the interest rate-growth differential and, using the ESCB's debt sustainability analysis tool, discuss the implications for government debt dynamics – both for the euro area as a whole (Chart A) and

[178] See Cochrane (2021b).

broken down into low-debt countries (defined as countries with debt below 90% of GDP in 2019) and high-debt countries (Chart B).[179]

Chart A

Implications of high/low inflation and policy responses for euro area debt dynamics



Source: ECB staff calculations.
Notes: Market-based indicators of inflation expectations with a cut-off date of December 2020 were used. The "high inflation" scenario shows sensitivity to different monetary policy responses with fiscal policy assumed to broadly comply with the SGP. The "low inflation" scenario assumes inactive monetary policy and shows sensitivity to different fiscal policy reactions.

Starting from the euro area aggregate, the first scenario ("high inflation") assumes a four-year cost-push shock[180] which brings inflation significantly above that assumed in the benchmark scenario of a gradual convergence towards the ECB's inflation aim (Chart A, panel a, blue line). Meanwhile, assumed real GDP growth in the "high inflation" scenario is below the benchmark assumption.[181] The implications for government debt sustainability in this "high inflation" scenario would call for trade-offs in the monetary policy response. Monetary policy tightening in line with a standard Taylor rule would reduce inflation towards the ECB's aim (Chart A, panel a, dark yellow line), but would lead to debt-to-GDP ratios stabilising later, after an initial, short-lived decline due to the pick-up in inflation, and staying at a higher level compared with the benchmark (Chart A, panel c, dark yellow line). By contrast, should the central bank fully accommodate the inflation surprise and keep interest rates unchanged (Chart A, panels a and b, light yellow lines), the implications for the debt outlook would be positive, with the debt-to-GDP ratio returning to pre-pandemic levels in less than a decade (Chart A, panel c, light yellow line). However, it would imply inflation remaining above the ECB's current inflation aim for many years, thus potentially challenging the credibility of monetary policy.

The second scenario ("low inflation") assumes that inflation remains significantly below the ECB's aim well beyond the medium term. The scenario is calibrated using market-based indicators of inflation expectations over the next decade, where inflation is expected to remain lower than in the

179 See Bouabdallah et al. (2017).

180 Such an episode has been observed for example in the late 1970s, when a sharp and persistent rise in inflation (partly related to oil price shocks) led to sharp and persistent monetary policy tightening.

181 The shock is simulated using a general equilibrium ECB-BASE model (see main text for more details). A demand shock that would have a positive impact on GDP is not considered in these simulations.

benchmark scenario (Chart A, panel a, dark orange line). Here, the central bank is assumed not to be able to counteract this lower inflation outlook, given the already very accommodative monetary policy stance at the ELB. Low inflation would be detrimental to debt sustainability and bring the debt ratio to a higher level compared with the benchmark. The debt ratio would stabilise assuming broad compliance with the SGP (Chart A, panel c, dark orange line) but would not stabilise in the medium term under an assumption of "no fiscal policy change" after 2023 (Chart A, panel c, light orange line).[182]

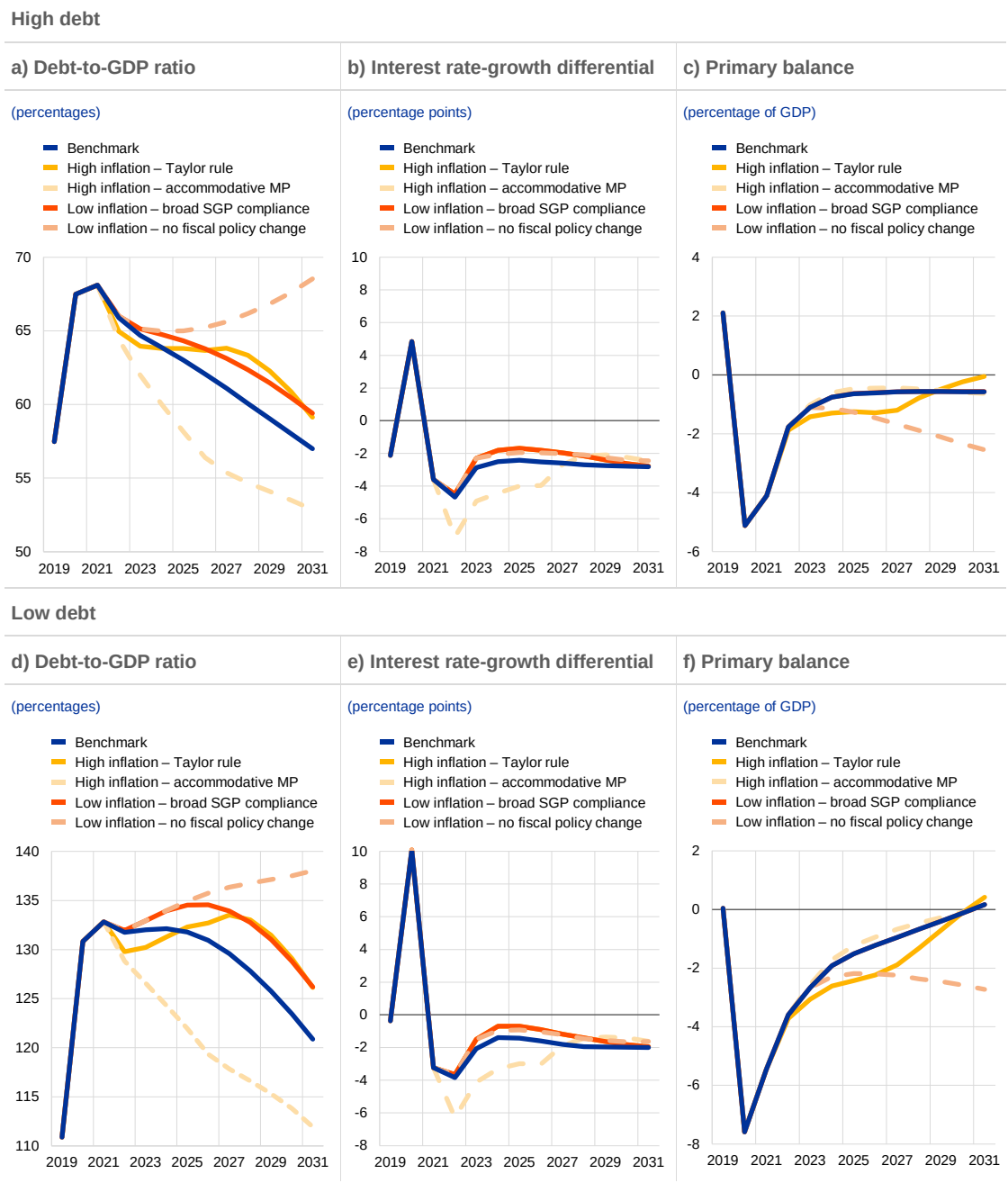
Given very different initial fiscal positions, the sustainability implications of the inflation shocks and monetary policy responses would be heterogeneous across countries (Chart B). Monetary policy tightening in the high inflation scenario would heighten debt sustainability risks, especially in high-debt countries. In this group of countries, debt ratios would temporarily decline in the first year after the inflationary shock, owing to the favourable denominator effect, but would then keep increasing for several years from already very high levels (Chart B, panel a), even though the interest rate-growth differential would remain firmly in negative territory (Chart B, panel b). The simulations suggest that the central bank can tighten monetary policy in a high inflation scenario without endangering debt sustainability in the high-debt group under the premise of a return to prudent fiscal policy in the medium to long run. Otherwise, the unfavourable impact of the large post-pandemic primary deficit on debt dynamics would outweigh the favourable impact of the negative interest-growth differential (Chart B, panel c). Accommodative monetary policy in the high inflation scenario would be particularly beneficial for countries with initially high debt levels (Chart B, panel a, light yellow line).[183]

[182] To interpret the results of this last simulation, it is important to stress that, by construction, the debt sustainability analysis tool cannot account for the possible side effects of a contractionary fiscal stance on inflation.

[183] Accommodative monetary policy in the high inflation environment boosts activity through low real rates. This effect is more beneficial for high-debt countries, given the higher GDP denominator effect.

Chart B

Implication of high/low inflation and policy responses for the debt dynamics in high and low-debt euro area countries



Source: ESCB staff calculations.
Notes: For the purposes of the aggregates shown in the chart, high-debt euro area countries are those with a 2019 debt-to-GDP ratio above 90%, namely Belgium, Greece, Spain, France, Italy, Cyprus and Portugal, while the remainder of the euro area countries are considered low-debt countries. The "high inflation" scenario shows sensitivity to different monetary policy responses with fiscal policy assumed to broadly comply with the SGP. The "low inflation" scenario assumes inactive monetary policy and shows sensitivity to different fiscal policy reactions.

The low inflation scenario would also be particularly challenging for high-debt countries. It would result in a further increase in the debt ratio in coming years. Debt ratios stabilise if governments abide by the SGP rules (Chart B, panel a, dark orange line), but not under the assumption of "no policy change" (light orange line). In addition, heterogeneities in terms of fiscal and macroeconomic prospects lead to significantly different country-specific results, even within each of the two groups.

Two important caveats should be borne in mind regarding this exercise. First, it only considers the responses of risk-free short and long-term interest rates to changes in the monetary policy stance, while no changes due to country-specific risk premia are considered.[184] As a result, the scenarios presented reflect only a symmetric increase and not a possible country-specific reversal of the interest rate-growth differential. Therefore, they should be interpreted as lower bounds in a range of effects on government debt. Second, the analysis does not cover all potential sources of such an increase. Notably, any idiosyncratic recessionary shock that can hit one (e.g. high-debt) euro area country in the upcoming decade could quickly bring the differential into highly unfavourable territory, posing a serious challenge to debt sustainability and possibly also to monetary policy.

3.3.2.5 Country-specific risks

The global environment of structurally low interest rates creates a "fiscally benign" constellation when supported by a sustained recovery. Assuming that there is the appropriate commitment to countercyclical fiscal (and growth-enhancing structural) policies, including in good times, the government debt of all member countries of the euro area can stay on a sustainable trajectory, notwithstanding differences in current levels. Coordinated efforts involving both high and low-debt countries can simplify this task and limit the risk premia of high-debt countries. The latter aspect is illustrated in Box 19, which describes interactions between monetary policy measures in the vicinity of the ELB, fiscal multipliers and the asymmetric fiscal space of member countries. To this end, the box considers a stylised monetary union, consisting of a high-debt and a low-debt country. A key finding is that an accommodative monetary policy stance can, in particular, help the high-debt country with currently limited fiscal space by lowering the real interest burden on government debt and containing an increase in risk premia. These benign effects can be reinforced through coordinated fiscal stimulus, also involving support from the low-debt country.

However, the debt paths of member countries are projected to show sizeable differences for years to come, well beyond the pandemic period and typically alongside continuing asymmetric legacy positions inherited from pre-COVID-19 times. This is shown in the second part of Box 18, which classifies countries with pre-COVID-19 debt-to-GDP ratios above 90% as "high-debt countries" and all others as "low-debt countries". None of the scenarios under consideration foresees that the difference between high and low debt trajectories would be reduced over the projection horizon until 2030. In view of such persistence, it is inevitable that member countries with high debt levels will be more strongly exposed to vulnerabilities, reflecting a worsening trade-off between stabilisation and sustainability at high debt levels. These vulnerabilities reinforce the challenge to ensure the countercyclicality

[184] The only exception is in the case of "no fiscal policy change", where a deterioration in the debt outlook relative to the baseline would induce higher costs, in line with Laubach (2009). In fact, in the event of a loss of confidence in a sovereign, there could be sudden and large increases in its financing costs, which could shift its debt path upwards or even make its debt unsustainable.

of fiscal policies, not only within the pandemic period (consistent with the flexibility provided by the current suspension of SGP rules), but also in good times.

Vulnerabilities of high-debt countries range from their exposure to belief-driven, non-fundamental rollover risk to fundamental weaknesses, possibly reinforced by a reversal of the critical interest rate-growth differential, which becomes more likely at high debt levels.[185] Taken together, these vulnerabilities can be the source of a range of conceivable contingencies, to be addressed through a differentiated spectrum of instruments and facilities involving different actors in line with their respective mandates, as mentioned in Section 1.3.3 above, which deals with conceptual aspects of monetary-fiscal policy interactions.

Under the special circumstances created by the pandemic, vulnerabilities are being addressed through a range of temporary instruments and facilities targeting pandemic-related weaknesses. Three innovations stand out.

1. **As regards monetary policy**, the market stabilisation function of the PEPP has created room to restore, when needed, the monetary transmission mechanism for solvent sovereigns and to provide liquidity when risks of belief-driven, self-fulfilling spirals threaten to undermine stability in the euro area as a whole.

2. **As regards EU initiatives**, targeted country-specific fiscal support will be most visibly provided through asymmetric disbursements from the newly created RRF, which constitutes the core of Next Generation EU, with tranches paid out in line with the Recovery and Resilience Plans. Loans offered to less performing and more vulnerable countries will benefit from favourable lending terms (lower interest rates, longer maturities), facilitated by common funding, while grants will offer extra fiscal space (as the corresponding debt does not count against SGP deficit calculations).[186] Early on, important support was provided by the safety net for workers (Support to mitigate Unemployment Risks in an Emergency, SURE) and via the European Investment Bank for businesses (see Section 3.2.2).

3. **As regards European Stability Mechanism (ESM) lines**, targeted country-specific support is available via Pandemic Crisis Support, which is based on the ESM's Enhanced Conditions Credit Line. The Pandemic Crisis Support credit line offers access to funding at very favourable conditions (lower than the pricing outlined for the ESM's usual precautionary credit lines). It is different from standard ESM macroeconomic adjustment programmes, as it comes only with COVID-related conditionality.

Over the course of the pandemic, these instruments and facilities will continue to offer valuable additional support, complementing the pre-pandemic toolkit

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185 For empirical evidence on state-contingent reversal probabilities, see Checherita-Westphal and Domingues Semeano (2020).

186 In addition, there will be indirect effects offering support. Bonds funding the RRF at EU level, when bought by the ECB through public sector purchase programmes, will be subject to the relatively higher supranational purchase limits of 50%. By contrast, ECB purchases of debt issued by member countries of the euro area are subject to limit considerations deduced from lower collective activation clause (CAC)-related thresholds of 33% (with exemptions temporarily granted to PEPP purchases).

for this exceptional crisis. On the monetary policy side, the public sector purchase programme (PSPP) offers less flexibility (given the stricter adherence to the capital key, stricter eligibility criteria and purchase limits of 33% for sovereign debt issued by member countries of the euro area) than the PEPP.[187] On the ESM side, programme support would come with conditionality, which in turn is a necessary condition for the activation of loss-shared Outright Monetary Transaction (OMT) programmes (while NCB purchases of member countries' debt under the PSPP and PEPP programmes are not loss-shared).[188]

Beyond the pandemic period, the question of how best to support and, if necessary, protect the single monetary policy of the ECB may need to be reassessed. Tensions will be reduced if all member countries not only maintain sustainable debt levels but also converge over time to more similar debt levels. A reduction in vulnerabilities associated with country-specific, persistently high debt levels greatly facilitates the smooth conduct of monetary policy in the multi-country setting of EMU. Ideally, a single, price stability-oriented monetary policy should only have to contend with a single, homogenous sovereign yield curve. As EMU is characterised by 19 fiscal policies predominantly decided at country level, credible commitments are required to restore sound positions where needed and to make sovereign debt fundamentals sufficiently similar across member countries of the euro area, thereby reducing vulnerabilities over time.

If inflation developments call for a normalisation of monetary policy, requirements for all member countries of the euro area to have sound fiscal positions will become more stringent over time, in line with the assignments of monetary dominance underlying the Treaty.[189] First, fiscal policies will need to rebuild fiscal space. In the case of upside risks to price stability, from the debt sustainability perspective a sufficiently countercyclical fiscal policy seems preferable to an early and/or sharp increase in real policy rates induced by monetary policy, as this may not be consistent with the forward guidance. In general, aspects of strategic complementarity between monetary and fiscal policies that characterise the current constellation will be phased out over time. Second, in the case of asymmetric country-specific shocks which are triggered (at least in part) by fundamental sustainability concerns, in the current set-up member countries can rely on the safety net that was constructed during the sovereign debt crisis. On the monetary policy side, this could include the decision of the Governing Council to activate OMTs, which, on the fiscal side, requires an ESM programme with strict and effective conditionality to improve the fundamentals.

For the normalisation of monetary policy, the management of the Eurosystem balance sheet – which, among other things, is currently characterised by large holdings of member countries' sovereign debt – will play a critical role.

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187 The PEPP includes a waiver of the eligibility requirements for securities issued by the Greek government, even though they were not eligible based on minimum rating requirements.

188 The benefits of ESM support are not limited to a possible activation of OMTs. Precautionary ESM Credit Lines also have an important market stabilisation function.

189 The impact of any increase in interest rates would be felt only gradually (via new issuances). The stringency of fiscal requirements will depend strongly on the growth perspectives that prevail when monetary policy begins to normalise.

Cancellation of the sovereign debt held by the Eurosystem is not an option. It would not only constitute a violation of the European Treaties, but it also lacks support from economic reasoning. From the perspective of the consolidated public sector balance sheet, such a cancellation would lead to losses by the central bank and corresponding gains by the government, which would wash out upon consolidation in accounting terms.[190] However, from an economic perspective, such a cancellation would have negative effects, as the transfer from the central bank to the government would make the central bank less independent (see Box 2 in Chapter 1) and undermine the credibility and effectiveness of monetary policy operations.

A distinctly different issue is the question over which horizon sovereign bond holdings will remain on the Eurosystem balance sheets. An extreme option discussed in the literature addresses the question of whether the current holdings should be made permanent. Such an option has a certain link to reasoning associated with (i) a strong version of the fiscal theory of the price level and alternatively (ii) "helicopter money". After a permanent monetisation of government debt previously held by the private sector, households may feel richer, assuming that only privately held government debt needs to be backed by future primary surpluses. This could lead to a constellation where the sum of money and bonds held by the private sector exceeds in present value the perceived tax burden, creating a wealth effect which stimulates spending and thereby the price level. The notion of helicopter money is similar to this, as it would also work through a permanent increase in perceived private wealth, engineered by the central bank through a direct and one-off transfer of base money to households that is not backed by future taxes.

Both variants – a permanent monetisation of debt holdings and a helicopter money scheme – are controversially discussed in the literature. Economically, the concepts are not without risks, as the assumed expectation channel may not work as required (Ricardian households). Alternatively, if the channel can be activated, it may work too strongly, also requiring mutually consistent actions in the future to control inflation dynamics and stabilise inflation expectations. Concerns might be raised that the fiscal framework would be damaged, and incentives for governments for sound fiscal behaviour in the future would be undermined. In addition, in many cases, proposals of this kind do not fully address the associated operational, accounting and legal complexities.

Uncontroversial, however, is the importance of a moderate approach to this question. It is commonly understood and practised by many central banks, including the ECB, that the horizon over which the central bank signals that it will hold its portfolio of government bonds is a central part of forward guidance and is key to the ability of the central bank to steer inflation. The length of this horizon is an important, state-contingent decision for the normalisation

[190] In addition, in the euro area context, since PSPP and PEPP purchases by NCBs are carried out without loss sharing, such consolidation would not change exposures between member countries.

of monetary policy, along with other variables such as the interest rate offered on reserves.[191]

Box 19
Effectiveness of national fiscal policy within the euro area in the context of the COVID-19 pandemic

The COVID-19 crisis has prompted a considerable fiscal effort, but with significant differences across euro area countries. In this context, it is crucial to understand the factors affecting the GDP impact of these measures, using a framework which takes into consideration the country's debt sustainability prospects.

The various channels influencing the effectiveness of discretionary fiscal policies across euro area countries during the COVID-19 crisis are illustrated below using the stochastic general equilibrium model developed in Andrés, Burriel and Shen (2020). This model considers a monetary union comprising two countries: one with a high public debt/GDP ratio and another with a more contained level of debt. The common monetary policy is set by the ECB, while each country decides its fiscal policy independently but follows a common budget rule, whereby deviations from a deficit of 3% of GDP and a debt-to-GDP ratio of 60%[192] are corrected gradually over time. The two countries cover their net borrowing in each period by issuing government debt. A key aspect of the model is that issuance costs depend on the sustainability of public finances in each economy. In particular, in a country with a public debt/GDP ratio considerably above 60%, investors consider that there is some risk of the state not having enough funds to finance this debt and therefore demand a risk premium above the risk-free rate set by the ECB.

According to the model, the monetary policy stance is key to fiscal effectiveness

Under normal circumstances, the central bank reacts to any rise in inflation by raising its interest rates in line with its conventional rule. The increase in activity in the short term, due to the effect of the fiscal stimulus, exerts upward pressure on prices, which leads the central bank to raise policy interest rates. This in turn causes inflation to ease but at the same time acts as a drag on activity, resulting in tighter financial conditions for the public and private sectors. In addition, fiscal expansion significantly increases the – already high – deficit and public debt ratios. Overall, the financial situation of the high-debt government worsens, prompting a rise in the risk premium required by investors, which in turn has an additional adverse effect on activity (see the blue lines in Chart A). By contrast, when the monetary policymaker maintains an accommodative stance, as was the case during 2020, the central bank does not react to the greater inflationary pressure derived from the short-term increase in activity, on account of the effect of the fiscal stimulus. Thus, higher prices trigger a decline in the real interest rate, which has a greater positive impact on activity in both the short and medium term (see the yellow line in Chart A, panel a). At the same time, maintaining policy interest rates unchanged results in an easing of the real cost of financing the debt of the country with little fiscal space. These factors limit the increase in the risk premium in the high-debt country (see yellow line in Chart A, panel b) and fuel the expansionary effect of fiscal policy.

[191] See, for example, Blanchard (2020).

[192] Levels set in the EU's SGP.

Coordinated fiscal actions are more effective, and fiscal space is key for multipliers

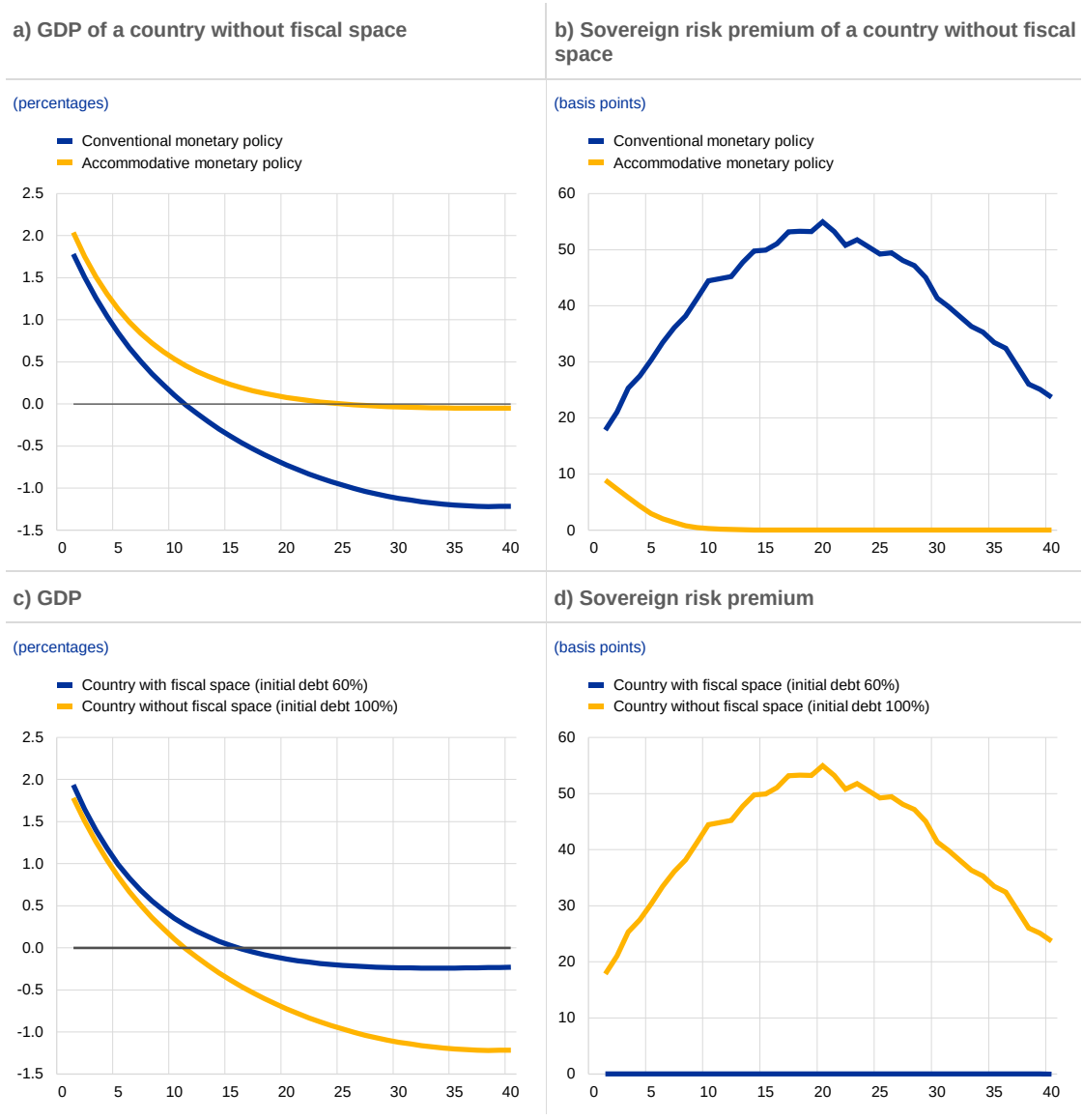
When public spending is increased simultaneously across all the countries in the monetary union, it generates greater inflationary pressure, which, against a background of accommodative monetary policy, leads to a sharper decline in real interest rates. Simultaneously, growth in activity in the rest of the euro area stimulates domestic activity through a rise in exports. Both aspects improve the outlook for the public finances of the high-debt country, which helps to contain the rise in the risk premium and, in turn, amplifies the expansionary effect of the fiscal impulse.

Finally, the effectiveness of fiscal policy is influenced by the fiscal space available in each country (see Chart A, panels c and d). As a result of the risk premium's endogenous response to public debt dynamics, fiscal policy is substantially more effective the lower the starting point of public debt and, consequently, the greater the fiscal space available.

These results show the relevant interactions between fiscal and monetary policy. In the current context of the COVID-19 crisis, by muting the sovereign risk channel, maintaining an accommodative monetary policy provides the necessary fiscal space for high-debt countries to respond to such large negative shocks. In addition, in this context, fiscal policy coordination within a monetary union becomes a key factor. One way to achieve this is by setting up supranational institutions. Once the economic recovery is clearly under way, these countries will be able to work towards rebuilding their fiscal buffers so that when the next recession comes, they will have accumulated the necessary fiscal space.

Chart A

The effectiveness of a fiscal impulse under various policy scenarios



Source: Banco de España calculations using the model described in Andrés, Burriel and Shen (2020).
Note: The variables are presented as differences with respect to the baseline scenario.

3.3.3 Concluding observations: benefits of institutional reforms

The analysis presented in this report takes the current EMU architecture as given. However, the overall outlook for monetary-fiscal policy interactions improves significantly if one reconsiders this assumption. From the perspective of the Eurosystem, there are clear benefits to be achieved if member countries use the historical momentum offered by the pandemic and embrace lasting, balanced reforms of the EMU architecture, including time-consistent solutions for resolving

legacy issues and residual weaknesses in the architectural framework.[193] Given the interdependence of the objectives to be achieved, there is scope for strong complementarities between individual reform measures with careful sequencing over time. However, while this point is of key importance for monetary policy, these concluding observations acknowledge the complexity of the issues under debate, because at political level there is no unique blueprint on how to improve the institutional completeness of a monetary union. This is partly due to a lack of genuine support among member countries for moving to a political union.

On the fiscal side, the current discussion on when to reactivate the currently suspended SGP, combined with a desirable reform of the framework, offers an opportunity for a more ambitious package of well-timed, complementary reforms. A key intention of these reforms should be not only to achieve better fiscal outcomes (including for constellations in which the policy challenges at the ELB discussed above are relevant)[194] but to strengthen the effectiveness of the ECB's single monetary policy in general and to unburden it under all contingencies.[195] Otherwise, the single monetary policy may have to contend with complicated trade-offs in the years ahead. However, there is no consensus on the specific design of the reform proposals. Beyond the near term, aspects of reforms discussed in the literature include, among others, ways of (i) clarifying legal and institutional preconditions so as to reliably restore fiscal sustainability when warranted; (ii) establishing a well-designed, incentive-compatible central fiscal capacity of sufficient size; and (iii) the perspective of a commonly shared sovereign safe asset, scaled up in conjunction with regulatory incentives to reduce the home bias of banks. In this regard, while the issuance of bonds by the European Commission to finance the NGEU can offer a promising path to a common safe asset funding new policy initiatives, there remains the question of how sovereign "legacy debt" can be better absorbed by private investors. In view of the currently large-scale Eurosystem holdings of sovereign debt issued by member countries, this question is directly relevant to the ECB, as it is linked to the question of how to normalise monetary policy over time.[196]

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193 A time-consistent solution would attempt to align incentives for all countries in recognition of their different legacy positions. A key tenet would be to reduce the vulnerabilities of high-debt countries accumulated in the past in exchange for a permanent and credible resolution of weaknesses in the fiscal framework, including weaknesses in the governance structure. The pandemic-related RRF, which can offer targeted one-off asymmetric support to countries that are currently more vulnerable, may offer a mechanism for facilitating such solution. Therefore, efficient use of RRF funds to support trend productivity and employment growth is highly important, including from a monetary policy perspective. For an early contribution in this regard, offering a much more nuanced view on the components that would make such a solution attractive for high and low-debt countries, see Centre for Economic Policy Research (2015).

194 In a similar vein, see Centre for Economic Policy Research (2018). For a recent reform proposal, see European Fiscal Board (2020), advocating a leaner, simplified SGP with a country-specific debt reduction rule, thus offering a credible medium-term anchor for fiscal policies.

195 Bianchi et al. (2020a) advocate the introduction of emergency budgets for COVID-19-related debt, suggesting that the monetary authority should tolerate an increase in inflation to accommodate this emergency budget.

196 Going back to Brunnermeier et al. (2017) and Garicano and Reichlin (2014), one hypothetical approach would be to provide incentives for the creation of well-designed common financial instruments, coupled with appropriate regulation, which would help to weaken the bank-sovereign nexus and contain destabilising flight-to-safety flows across borders. In this regard, there has been extensive analysis of proposals for creating diversified sovereign claims of different seniority, combining features of (i) pooling and (ii) tranching in different ways, as summarised by Leandro and Zettelmeyer (2019).

Stronger incentives for improved structural policies are of major importance for the functioning of EMU in general and for the ability of fiscal policies to support macroeconomic stabilisation and monetary policy (especially at the lower bound) in the event of downturns and major adverse shocks without endangering debt sustainability. NGEU offers a unique opportunity for enhancing structural policies, which reduce problematic heterogeneity, asymmetries and vulnerabilities among euro area countries. Better economic structures and a higher quality of economic and public institutions could help to raise long-term productivity and employment growth (and address inequality), which in turn would lower the public debt path without the need to raise tax rates or cut expenditures.

Alongside fiscal and structural reforms, improvements in the integration of financial markets to strengthen private risk sharing, together with the completion of banking union, can offer sizeable welfare benefits. The pandemic has intensified the interdependencies between firms, banks and sovereigns. Government guarantees have been vital for stabilising the economic and financial situation during the pandemic, and liquidity support from fiscal policies and banks for the corporate sector has proved crucial for protecting employment and overall activity. However, the increased interdependencies may lead to adverse sovereign-bank-corporate feedback loops that could put macroeconomic and financial stability at risk in some countries, thereby creating also risks to the sustainability of government debt. In view of these interdependencies, measures to de-risk banks over time, with the intention of reducing undesirable tail risks and feedback loops in the bank-sovereign nexus, remain a key priority, and in this respect there is a link between monetary-fiscal policy interactions and financial market aspects. Because of this link, there are complementarities between the completion of banking union, the development of capital markets union, the introduction of a euro area safe asset and the weakening of the bank-sovereign nexus. A true area-wide financing union would ensure equal protection of insured depositors and strengthen cross-border integration and risk sharing through the banking system and capital markets. In particular, it would both facilitate geographic asset diversification by banks via appropriate regulation and dilute the domestic financial impact of a sovereign debt restructuring in the event that such a restructuring became unavoidable. The benefits of these measures would tend to be larger within monetary unions than for single economies given the lack of independent monetary policy at country level. In addition, such measures are also likely to be more feasible within monetary unions, given the absence of currency risk.

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